

The University of Chicago

AUGUSTA COUNTY, VIRGINIA—A
STUDY OF PATTERNS

A PART OF A DISSERTATION SUBMITTED TO
THE FACULTY OF THE DIVISION OF THE
PHYSICAL SCIENCES IN CANDIDACY FOR THE
DEGREE OF DOCTOR OF PHILOSOPHY

DEPARTMENT OF GEOGRAPHY

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G. DONALD HUDSON

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Section 1. Area, Purpose, And Plan

The Location of the County.- Augusta County lies in the northwestern part of Virginia, occupying approximately the upper third of the Shenandoah Valley. The eastern and western boundaries of the county follow the summits of mountain ranges, the Blue Ridge on the east and the Shenandoah on the west.² The southern boundary extends across the valley from ridge to ridge, following in a general way the divide between the head streams of the James and Shenandoah rivers. The northern boundary cuts across the valley at right angles to its axis. The county thus forms an approximate square. It measures roughly thirty-three miles from east to west and thirty-one miles from north to south, enclosing 1,006 square miles within its borders.

The Longitudinal Pattern of the Landscape.- No better view can be obtained of the county than from the top of Betsy Bell, one of two cherty knolls that stand almost in the center of the

¹This paper is an abridgement of the author's doctoral dissertation which, in its complete form, consists of the following: (1) 203 manuscript pages, (2) 89 maps, (3) 51 pictures, and (4) 6 tables. It is suggested that the reader consult: (1) Goode, J. Paul: School Atlas (Rand McNally and Co., fourth edition, 1932), pages 58 to 69 and 84-5, and (2) the following U. S. G. S. topographic sheets: Staunton, Harrisonburg, Buckingham, and Buena Vista.

²For purposes of simplicity, local terms of direction are used throughout this study. Down the valley is "north" and up the valley is "south," although, in fact, the first is slightly north of north-northeast, and the second, slightly south of south-southwest. The summits of the two ranges, the Blue Ridge and the Shenandoah, are spoken of as constituting the eastern and western county boundaries, when, as a matter of fact, they lie to the east-southeast and west-northwest, respectively.

area (Fig. 1). From this eminence the pattern of the landscape appears in its simplest form. At the extreme west is a wide mountain slope, completely forested. Next comes a series of valleys that are shallow toward the north but widen out to form Calf Pasture Valley to the south. Then comes a row of ridges, forested, that reach their climax to the south in the height of North Mountain. East of North Mountain is a second relatively wide valley, that of Little Calf Pasture River, and then comes a wooded longitudinal ridge, Little North Mountain.

Separating the row of ridges and Little North Mountain from the major valley plain is a belt of land made up of a series of low rounded hills separated by shallow valleys. Most of the hills are wooded, perhaps two out of three. The others are the more rounded of the hills, their broad tops providing space for some open pasture land and a few fields. Most of the valleys are wooded, but a few, such as appear at some of the mountain gaps, provide small areas of pasture and cultivated land. Both hills and valleys promise little population.

East of this belt of foothills is a broad valley floor that occupies about half the area of the county. That portion of the valley floor which lies west of the Valley Pike is a rolling plain. Some of the hills are wooded but the valleys and the broader knolls are dominated by open pastures and cultivated fields. Most of the area east of the Pike is a gently undulating plain, the broad valleys of Middle and South rivers. Large, cultivated fields and wide, open pastures cover the landscape, patched here and there by clumps of trees that top low knolls and narrow bands of trees that border minor streams. Beyond is a belt of foothills matching the belt that lies to the west. Then comes the steep, forested slope of the Blue Ridge.

The Purpose and Plan of the Study.- This dissertation is concerned with outstanding patterns of Augusta County. It is based on detailed quantitative data, the accumulation of which followed a preliminary but thorough reconnaissance survey of the county. These data were accumulated from two sources, namely, systematic traverses and census schedules covering individual farms. In the development of the methods adopted and the subsequent use of the data obtained, the technical problem arose of how to apply fractional and other recently developed techniques to an area the size of Augusta County. In addition to presenting a pattern treatment of Augusta County, therefore, this dissertation represents an experiment in scale of geographic research in point of area, time, and detail.

The methods used.- The methods devised are based upon the theory of sampling. The first step involved the use of an arbitrary grid that divided the county into 115 equal area rectangles, measuring two and one-half miles by four miles. Each of these rectangles was studied in the field and on the basis of census data.

1. Measurements made in the field.- Field measurements were made by running a series of road traverses across the county. Ninety-six of the total 115 rectangles were included. The remaining seventeen were not included because they are without roads. Without exception, however, these seventeen rectangles covered areas that could be seen to be virtually entirely wooded, and they were so recorded. In making the traverses a record was made for each side of the road of the frontages of each type of land utilization. These frontages were measured with a double-

crop-frontage meter (Fig. 2).¹

The isopleth method was employed in determining and presenting the distributions of the many items studied. The frontages obtained in each rectangle were expressed in terms of their percentages of the total length of roads traversed in that rectangle. For example, if the total frontage of corn land on the roads of a given rectangle was found to be one mile, and the total length of roads traversed in that rectangle came to ten miles, the frontage of corn land was expressed as 10 per cent of the total. On the assumption that the ratio of the frontage of corn land to the total length of the roads traversed is the same as the ratio of corn acreage to the total area of the rectangle, the amount of corn land was taken to be 10 per cent of the total. To determine the distribution pattern of corn land, these percentages were plotted on a map of the county, each figure being placed in the center of the rectangle it represented. The percentages were grouped into convenient class intervals and isopleths were drawn, representing the upper and lower limits of the intervals. The areas thus marked off by the isopleths, because more than one rectangle was enclosed, are described throughout the study in terms of the upper and lower limits of the class intervals.

2. Data from census schedules.-² The field measurements provided data covering all types of land. The census schedules

¹Loaned by the United States Department of Agriculture through the courtesy of W. F. Callander, Chairman, Crop Reporting Board, U. S. Dept. of Agri., and Henry M. Taylor, Agricultural Statistician, Division of Agricultural Statistics, Va. State Dept. of Agri.

²Appointment as a special agent in the Bureau of the Census, U. S. Dept. of Commerce, was obtained through the courtesy of W. M. Steward, Director, thus making possible access to the records of the Bureau.

provided data covering only land in farms. In addition to facts concerning land utilization corresponding to those obtained from field measurements, the census schedules made possible the accumulation of a great body of materials such as land values, products sold, incomes, and livestock densities, without the necessity of spending long hours interviewing individual farmers.

The census schedules cover a total of 225 farms, three from each of the seventy-five rectangles that included occupied farm land. The farms were selected only in terms of their distribution, their being as widely distributed in each rectangle as was feasible.

Census data relative to land utilization were treated much like the data obtained by field measurements. Each group of three farms constituted a sample of the entire rectangle. If, for example, 10 per cent of the land in the sample farms of a given rectangle was in corn, then that rectangle was taken to have 10 per cent of its total farm area in corn. In dealing with matters other than land utilization, land value, for example, the average per acre value of the three sample farms was taken as representative of the rectangle they were in. Values per farm, and other items using the farm as the unit, were expressed in terms of the average of the three farms in each rectangle. As before, the data covering the rectangles were plotted by rectangles on a map of the county and the areas described by the upper and lower limits of the class intervals marked off by isopleths.

The techniques employed.- In determining the final distribution patterns in connection with both the field and census data, isopleths were drawn according to their numerical position in relation to the centrally placed figures in each rectangle

unless known factors drawn from maps, the literature, or from observation in the field warranted their deviation. The methods employed in connection with field and census data involved, then, the application of such established techniques of research in geography as observation, photographic and written records, compilation, reconnaissance, the traverse, and the isopleth. In addition, for the first time, an equal area, small mesh grid is used giving the traverse areal as well as lineal application and census data are distributed over a sizable area in units less than townships. In connection with the urban parts of the county, the conventional classification and methods of mapping were employed. Essential details that could not be observed in the landscape were obtained through interviews with appropriate persons.

Section 2. The Distribution Of Population

The population pattern and transportation pattern, which is treated in the following section, perform several functions, an understanding of which is highly important at this juncture, because they lay foundations for subsequent materials. For example, they forecast the relative concentration of the activities of the people in the various sections of the county, indicate the relative intensity with which the land is utilized and, in large measure, point to the relative productivity of the land and the comparative wealth and prosperity of the people, one area as compared to another.

The total population of Augusta County is 50,153. One of the more outstanding features of the pattern of the distribution of population is its close adherence to valley plain areas (Fig. 3). Nearly all the people live in the major valley plain. More than half the remainder live in the two Calf Pasture valleys. The eastern foothills are virtually uninhabited, as are, also,

the mountain areas. The western foothills are only sparsely peopled.

People in the Major Plain.- Approximately 96 per cent of the people of Augusta County, roughly 48,000, live in the major valley plain and the two Calf Pasture valleys. All but 4 per cent of these live in the major valley plain, an area equal to about half the area of the county. Within the area there are two major concentrations, Staunton and Waynesboro. The first has a population of 11,900, and the second, a population of 6,226. Staunton lies in almost the exact center of the county, and Waynesboro in the east-central part of the county below Rockfish Gap in the Blue Ridge. These two centers include roughly 36 per cent of the county's population or about 40 per cent of the people of the major valley plain. Outside of them the pattern is made up of five features: (1) major alignments, (2) major clusters, some of which fall in the major alignments, (3) minor alignments, (4) minor clusters, and (5) scattered farmsteads.

The four major alignments.- There are four major alignments. Three are co-ordinated with major highways that divide the county into northeast, southeast, southwest, and northwest quadrants, namely the Valley Pike and the Richmond-Monterey Highway (Fig. 1). One alignment extends from Staunton to the northern county boundary following the route of the Valley Pike. In this alignment there are three major clusters. One is a suburban section of Staunton; the second is Verona Rolla, a little village about four miles north of Staunton; and the last is Mt. Sidney, a village about midway between Verona Rolla and the northern boundary. A second major alignment reaches from Staunton to Waynesboro, following the Richmond-Monterey Highway. It has one major cluster, Fishersville, a cross-roads village about midway

between the two towns. The third major alignment lies along the Valley Pike south of Staunton. The village of Greenville forms a major cluster in this alignment about ten miles south of Staunton. The last major alignment lies west of Staunton along the Staunton branch of the Harrisonburg-Goshen highway. No major clusters fall in this alignment.

The seventeen major clusters.- There are seventeen major clusters of population. Five of these have been accounted for in the four major alignments. The remaining twelve are irregularly spaced over the major valley plain. Two occur in the northeast quadrant,--Weyers Cave and New Hope; three appear in the southeast quadrant,--Stuarts Draft, Lyndhurst, and Sherando; two are in the southwest quadrant,--Middlebrook and Spottswood; and the remaining five clusters are in the northwest quadrant,--Churchville, Parnassus, Mt. Solon, Spring Hill, and Centerville (Fig. 1).

The minor features of the pattern.- The people constituting the above portions of the pattern total approximately 53 per cent of the population of the major valley plain. The remaining 46 per cent form the remaining three features of the pattern, namely: (1) minor alignments extend along secondary roads, reaching from highway to highway or village to village, and independently through the more densely peopled areas; (2) minor clusters representing, for the most part, little cross-roads villages fall along and in between the major highways and secondary roads; and (3) scattered farmsteads complete the details of the design filling in many of the remaining spaces.

People in the Calf Pasture Valleys.- The remaining 4 per cent of the 48,000 people who live in valley plain areas, live in the two Calf Pasture valleys. Strikingly enough, the combined area of these two valley plains is about 4 per cent of

the total area of the county. Nearly all of the people of these two valley plains, approximately 80 per cent, live in or near four villages that constitute four major clusters in the pattern, namely, Deerfield, in Calf Pasture Valley, and Augusta Springs, Fordwick, and Craigsville in Little Calf Pasture Valley (Fig. 1).

People in the Foothills.- Virtually all of the remaining 4 per cent of the county's population live in the foothills bordering the valley plain areas. In the foothills to the west most of the people are gathered in minor clusters at mountain gaps, such as, for example, at North River Gap, between Narrow Back Mountain and Lookout Mountain. The eastern foothills are very sparsely settled. A few scattered farmsteads appear northeast of Waynesboro, and a long, indistinct alignment reaches up Back Creek Valley south of Sherando.

People in the Mountain Areas.- The mountain areas constitute about a third of the county, but contain less than 1 per cent of the county's population. With insignificant exceptions, the people that live in the mountains are gathered in three small clusters. One is the village of Stokesville near North River Gap; a second is at Buffalo Gap; and the third is in Back Creek Valley.

Section 3. The Transportation Pattern

There is, obviously, a high degree of correlation between the distribution of population and the pattern of transportation, because settlements follow roads and roads follow settlements. The transportation pattern of Augusta County is made up of the county's dense network of primary highways, secondary highways, and local dirt roads, and its skeleton pattern of railroads (Fig. 1). In the major valley plain the design forms a closely woven web. Staunton stands out as the major focal point with five highways and four railroads forming the major radii, and three second-

ary roads and three spurs forming the secondary radii. Waynesboro constitutes another focal point second to Staunton in importance. Five primary highways, four railroads, and two secondary highways and spurs make up its radii. Scattered throughout the major valley plain are small focii; the cross-roads villages that form major clusters in the population pattern. In most cases the radii of these focii are crossings of two secondary highways, or one secondary highway and one primary highway. Completing the mesh of the valley plain web are the local dirt roads that connect the radial roads and scattered farmsteads. Outside of the major valley plain population is sparse and the roads are few and far between. Longitudinal roads serve the longitudinal alignments and also the clusters that occur in the longitudinal valleys. A few lateral roads reach up foothill valleys to serve the scattered foothill population. Fewer lateral roads, mostly forest service routes, cross the virtually uninhabited mountain areas.

Highways.- The roads of the county are of three classes, namely: (1) primary highways, (2) secondary highways, and (3) local roads. The first group consists of five paved trunk lines now, or in the process of being made into three lane highways, that constitute the major strands in the web of highways and roads. The Valley Pike and Richmond-Monterey Highway have already been noted. The third is the Harrisonburg-Goshen highway. It enters the county between Mt. Solon and Centerville and extends southward, leaving the county just beyond Craigsville. The Staunton branch of this highway forms the fourth of the five major highways. It extends west from Staunton to Buffalo Gap. The fifth, the Harrisonburg-Waynesboro Highway extends northward from Waynesboro parallel to South River, leaving the county near the northeast corner of the major valley plain.

The secondary highways, all paved or improved, form the major connecting links between primary highways and major population clusters. In keeping with these functions and the longitudinal trend of the landscape, they follow a general north-south direction, minor spurs branching off here and there along their routes.

The local dirt roads give the highway web its body, filling in the gaps between the major strands and connecting links. Most of them are unimproved and can be used with ease only in seasonable weather.

Railroads. Two railroads traverse the county from north to south (Fig. 1). One, a Baltimore and Ohio branch line, lies parallel to the Valley Pike passing through Mt. Sidney, Verona Rolla, Staunton, Greenville, and Spottswood. The other, a major branch of the Norfolk and Western, enters the county at the northeast corner of the major valley plain and extends southward along South River passing through Waynesboro and Stuarts Draft. It leaves the county near the Valley Pike. From east to west the county is crossed by a main line of the Chesapeake and Ohio Railroad. It enters the county above Waynesboro at Rockfish Gap, goes through Waynesboro, Fishersville and Staunton, and then turns south down Little Calf Pasture Valley after passing through Buffalo Gap. These railroads follow, in general, the routes taken by major highways, adding emphasis to the focal positions of Staunton and Waynesboro. The only other railroad in the county is a short, infrequently used branch line in the northwest corner of the major valley plain. It extends from Mt. Solon to the northern county boundary.

Section 4. The Patterns Of Rural Land Utilization

The rural uses made of land constitute the principle

components of the county's patterns and reveal the county's dominantly agricultural personality. The total area of Augusta County is 1,006 square miles, or approximately 641,920 acres. About 635,920 acres can be classified as rural land, the remaining six thousand being taken up by the two towns, Staunton and Waynesboro.¹ Nearly 55 per cent of the rural land, 346,047 acres, is in farms. The rest is, for the most part, forested. Not all of the farm land produces agriculturally. There are 38,648 acres of unpastured woodland, 1,275 acres on which crops failed, 5,254 acres of idle or fallow land, and 12,934 acres in farmsteads, and other agriculturally non-productive uses. This makes a total of 58,111 acres of farm land which do not produce agriculturally, leaving a total of 287,936 acres of productive agricultural land, or 42 per cent of the area of the county. There are, then, three major types of land in the county: (1) productive agricultural land, (2) non-productive agricultural land, and (3) non-agricultural land. The uses to which these three major classes of land are put and the physical settings to which they are related are brought out in the sections that follow.

The Five Major Divisions of the County.- The patterns of rural land utilization in Augusta County are based on the uses made of the land and the uses made of the products of the land. On these bases five major divisions become evident, namely: (1) the non-agricultural forested mountain division, (2) the wood-

¹Census data cover the county for the year 1929-30. Field data and observations cover the county for the year 1932-33. Since changes in the agricultural use of land take place slowly, these two sets of data can be legitimately thought of as covering the county for the same agricultural time interval. The use of the present tense in discussing the many patterns treated in this study will aid the reader in thinking of the data in these terms.

lands-pasture foothill division, (3) the pasture-crop-woodlands valley plain division, (4) the pasture-crop rolling plain division, and (5) the crop-pasture undulating plain division (Fig. 4).

The non-agricultural forested mountain division.- The non-agricultural forested mountain division, as revealed by the isopleths of 100 per cent unpastured woodland and forests, falls into three sections: (1) along the eastern boundary of the county the forested mountain slopes form a strip about one mile wide from the northern county boundary to a point east of Sherando. At that point it bulges westward, covering approximately forty square miles in the southeast corner of the county. (2) The forested area of North and Crawford mountains constitute an irregular, elongated north-south section, pointed at both ends. It measures about three miles at its widest point and is about sixteen miles long. (3) The Shenandoah forested area is about eight miles wide along the northern county boundary. It maintains this width to Jennings Gap. From there it tapers off rapidly, curving westward around the head of Calf Pasture Valley in a strip from one to three miles wide.

Most sections are above the two thousand foot contour line. Excellent views are thus provided of the foothills and valley plains that lie below. Attractive ruggedness is provided by steep slopes, innumerable narrow valleys, and sharp, rocky ridges and cliffs. Scattered here and there throughout the mountains are small park-like areas, some natural and some representing old clearings. These give pleasant variety to the mountain scenery. All of the slopes are wooded, some quite heavily. The entire division is cut by mountain streams, many of them broken at frequent intervals by water falls and rapids. During the months of rain they are rushing torrents, but during the dry months

many of the streams disappear, leaving deep, rock-strewn gorges. The soils are, for the most part, the coarser types of the residual shale and sandstone group. Alluvial soils occur in the valleys and residual granites occur on the higher levels of the Blue Ridge. All the soils are shallow and low in fertility, and many of them are broken by outcrops and strewn with rocks and boulders. Although these mountain sections are sought for recreational purposes because of their natural beauty, this function is decidedly secondary to the major function. As forest preserves they play an important part in the control of floods, the retardation of erosion, and the development of power and transportation in the Great Valley of which they are a part. With proper care and development they also can play an important part in the supplying of timber for future generations.

The woodland-pasture foothill division.- The woodland-pasture foothill division consists of two belts. The first forms a strip averaging about one and a half miles wide along the base of the Blue Ridge from the northern to the southern county boundary. The other belt lies in the western part of the county. It is about two miles wide from the northern boundary in the Stokesville area to Jennings Gap, forming a strip along the bases of Narrow Back and Lookout mountains. At Jennings Gap it divides into two bands. One band continues southward along the bases of Crawford and North mountains, widens out to include Little North Mountain, and then divides to form a short, narrow strip on each side of Little Calf Pasture Valley. The other band continues southward from Jennings Gap, dividing into two narrow strips, one on each side of Calf Pasture Valley.

A relatively small amount of the land in these areas produces agriculturally, the remaining sections being, for the

most part, unpastured woodlands. The distribution of these two types of land is, as was previously noted, definitely related to the topographic features of the land. Nearly all of the productive agricultural land is in pasture, some cleared, and some wooded. The distribution of these pastures is related to topographic features and to the prevalence of coarse, residual shale and sandstone soils, relatively low in fertility. Obviously the pastures in these areas can be used only for the rearing of livestock. The result is, that from 90 to 100 per cent of the productive agricultural land can be classified as livestock land (Fig. 5). What remains is used, primarily for producing food for the families of farm operators.

The pasture-crop-woodlands valley plain division.- The pasture-crop-woodlands valley plain division consists of the plain areas in the two Calf Pasture valleys. The Calf Pasture area forms a rough triangle with its base extending east and west across Hamilton Draft and Calf Pasture valleys. It is about four miles wide at the base and about ten miles long from base to apex. The Little Calf Pasture area forms a loop with its base at the southern county boundary. It is about four miles wide and eight miles long.

Most of the land in these two areas is used for pasture, some is cultivated, hay being the dominant crop, and some is in unpastured woodland. These uses are associated with the topographic and soil features of the land. Narrow bands of relatively level land and alluvial soils border the streams. These areas are used primarily for pastures and crops. The rest of the land is rolling to steep, and is provided, for the most part, with coarse residual shale and sandstone soils. Pastures and unpastured woodland dominate these sections. Not so much of the

productive agricultural land is used for livestock rearing as in the foothill areas. The percentage thus used ranges from 80 to 90 (Fig. 5). The small remaining proportion is about equally divided between cash crops and foodstuffs for family consumption.

The pasture-crop rolling plain division.- The pasture-crop rolling plain division is bounded on the west by the western belt of foothills. The eastern boundary divides the major valley plain into halves, following rather closely the Valley Pike and roughly approximating the isopleth of 45 per cent harvest land. Thus included in this division are the more rolling sections of the major valley plain, the eastern halves of the two western quadrants noted in connection with the landscape view of the county. The soils are almost exclusively of limestone origin, with fine sandy, silt, and clay loams predominating, and gravelly and stony clay loams holding prominent, though secondary ranks.

Pastures occupy most of the productive agricultural land, a use that is associated with the rolling topography and prevalence of excellent limestone soils. Small grain is the leading crop in most sections of the division. Three exceptions occur. Hay is the leading crop in a diagonal belt of land that lies between Mt. Solon, and Parnassus and Centerville (Fig. 4). It is also the leading crop in the central portion of the division around, and north and south of Staunton. Commercial orchards between Swoope, Churchville and Staunton give orchards a prominent place among the crops in that section, sharing first ranks with hay.

This division is distinctly a livestock rearing area except in the commercial orchard section (Fig. 5). In five of the twelve rectangles in the northern part of the division between 90 and 100 per cent of the productive agricultural land

is used for livestock rearing purposes; in three, from 80 to 90 per cent of the land is so used; and in four, the percentage of the productive agricultural land used for livestock is between 70 and 80. In five of the thirteen rectangles that occupy the southern part of the division from 80 to 90 per cent of the productive agricultural land is used for rearing livestock; in seven rectangles the percentage is between 70 and 80; and in the last, a small grain area, between 50 and 60 per cent of the productive agricultural land is so used. In one of the four middle rectangles from 80 to 90 per cent of the productive agricultural land is used for livestock. In twenty-five of the twenty-six rectangles thus far noted, then, less than 25 per cent of the productive agricultural land is in cash crops. In the small grain section noted in the southern part of the division 40 per cent of the land is in cash crops, small grain being the leading crop. The remaining three of the four middle rectangles include the commercial orchards previously noted. In these rectangles between 25 and 30 per cent of the productive agricultural land is in cash crops, that is, orchards, whereas pastures and livestock crops occupy from 70 to 75 per cent of the productive agricultural land. Taking the division as a whole, a smaller percentage of the productive agricultural land is used for supplying products directly to the families of farm operators than in the divisions already treated. In general, the percentage so used ranges from 1 to 5, with the majority of rectangles around 2 per cent.

The crop-pasture undulating plain division.- The crop-pasture undulating plain division occupies the eastern half of the major valley plain. It thus includes the broad undulating plain of the lower Middle River Valley and of South River Valley. The

soils are of three main types, forming three longitudinal belts of approximately equal size. From west to east they are: (1) a V-shaped area of "blue slate" land, residual shales, (2) limestone soils, mostly fine sandy and silt loams, and (3) residual soils from old alluvial deposits. A fourth type, deep, rich, alluvial soils is scattered in narrow bands along the many streams of the division. In all rectangles included in the division more productive agricultural land is used for livestock rearing purposes than for any other purpose, but in twenty-five of the thirty-one rectangles the percentage of land so used is below 75 (Fig. 5). In other words, this division should be characterized as a livestock rearing-cash crop area. Two sections are exceptions to this general rule. One section includes the four eastern of the northern row of five rectangles. In these rectangles from 75 to 90 per cent of the productive agricultural land is used for livestock. In them, pastures, corn, and hay are prominent features. The other section includes the two southernmost rectangles that border the foothills. In them from 75 to 80 per cent of the productive agricultural land is used for livestock. This section is, essentially, a pasture-corn-small grain area. In other words, then, these two sections are like the preceding division just as the commercial orchard area of the preceding division is like this one.

The remaining twenty-five rectangles show some individual variations, but they are alike in that from 25 to 47 per cent of the productive agricultural land is in cash crops. Most of this acreage is in wheat, but in some sections, particularly those between Stuarts Draft and Sherando, and to a less degree, those around Staunton and Waynesboro, orchards occupy enough land to stand out in the cash crop acreage. Roughly speaking, the western margin of the division is occupied by seven transitional

rectangles with the cash-crop acreage amounting to between 25 and 30 per cent of the productive agricultural land. In the central and north-central rectangles, numbering fourteen, the amount of cash-crop land is from 30 to 47 per cent of the productive agricultural acreage with the higher percentages in the areas of larger wheat acreages. Of the remaining three rectangles, those lying around and between Stuarts Draft and Sherando, the two westernmost, have a cash-crop acreage of around 35 per cent of the productive agricultural land. The last has a percentage of only seventeen. In these three rectangles the cash-crop is primarily orchard fruits. As a whole, this division is much the same as the preceding one as to the amount of land that is used for producing farm foodstuffs. In general, the percentage of productive agricultural land thus used averages about two.

Livestock Rearing in Augusta County.- The important place held by livestock rearing in Augusta County is demonstrated by the large proportion of productive agricultural land used for that purpose (Fig. 5). This prominence of livestock rearing is due, in part, to the nature of the land. Much of the land, particularly the limestone sections, is best suited to pasture uses, and much of the land is well, if not best suited, to the production of hay and grain. Another factor grows out of the tradition of the county, and in fact, that of the entire length of the Shenandoah Valley and northern sections of the Great Valley. This tradition is an expression of the nature of the land, and of the fact that these portions of the Great Valley offered the first extensive and rich possibilities for livestock rearing west of the Blue Ridge.

Specific relationships between the distributions of livestock acreages and the nature of the land were noted in the foregoing chapter. It remains now to determine the kinds of live-

stock reared, their relative prominence, and their individual and combined distributions. The treatment of these items brings out their relationships, one with the others, and their association with land uses and the land.

Types of livestock rearing.-¹ Practically all types of livestock characteristic of the United States are reared in Augusta County (Fig. 6). Certain types are, however, much more prominent, giving this phase of the county's agriculture a definite center of gravity. In numbers, the livestock of the county rank as follows: (1) poultry, 223,779, (2) sheep, 56,671, (3) cattle, 34,299, (4) swine, 24,453, (5) horses, 7,931, (6) goats and kids, 390, (7) mules, 156, and (8) asses and burros, 6. This obviously, is not an adequate basis for determining the relative importance of each group. A much better conception can be obtained by ranking them on the basis of livestock units.² On this basis they rank as follows: (1) cattle, 23,883, (2) sheep, 8,095, (3) horses, 7,479, (4) swine, 4,890, (5) poultry, 2,237, (6) mules, 148, (7) goats and kids, 55, and (8) asses and burros, 3. Because of their outstanding importance, attention, in this study, is centered on the first three groups.

1. Cattle.- The cattle industry, the most important of the livestock industries, is about equally divided between the production of dairy products and beef. There are 34,299 head of cat-

¹All livestock data used in this section were obtained from the 1930 U. S. Census. The unit area employed throughout the chapter is one hundred acres of farm land.

²In this study one livestock unit = 1 horse = 1 mule = 1 cattle = 2 asses or burros = 5 swine = 7 sheep = 7 goats = 100 poultry. Animals in the first four groups that are two years old or less are rated as equal to one-half the unit value of mature animals. In the remaining four groups young and old stock are rated the same. This represents a slight modification of the system of the U. S. Department of Agriculture, a modification made for purposes of simplicity.

tle in the county, representing 9.1 per cent of the total head of livestock, or 51 per cent of the total livestock units. Taking the county as a whole there are ten head of cattle per one hundred acres of farm land.¹ This density, and the fact that there are more cattle units than all others combined, indicate that cattle rearing is the center of the livestock industry. The cattle are of three classes: (1) beef, (2) dairy, and (3) young stock. Assuming that the young stock will be used for beef and dairy purposes in the same proportion that mature animals are now used, the three groups can be combined into two: (1) beef cattle, numbering 18,063 head, or 53 per cent of the total, and (2) dairy cattle, numbering 16,236, or 47 per cent of the total. When these are expressed in cattle units, the emphasis shifts to dairy stock, there being 13,401 dairy units, 56 per cent of the total cattle units, and 10,483 beef units, 44 per cent of the total cattle units.

2. Sheep.- There are 56,671 head of sheep in Augusta County representing a density of approximately sixteen head per one hundred acres. They constitute 15.1 per cent of the total number of livestock or 17.2 per cent of the total number of livestock units. Virtually 44 per cent of the sheep, 24,830, are breeding and wool producing stock -- that is, mature ewes. The number of rams, wethers, and ewes less than six months old is 26,985, 48 per cent of the total. Rams and wethers, and yearling ewes, number 1,473 and 3,383, respectively. These figures indicate that the sheep rearing industry is carried on for the production of meat and wool. Most of the ram and some ewe lambs are sold

¹According to sample data farms average about 200 acres each. County-wide census data give the average as 131 acres per farm.

off as young stock for meat. The better ewes are held over for their wool and for the replacement of old breeding stock. The similarity in the number of young stock and mature ewes indicates that few, if any, lambs are shipped in or out of the county as feeders, the home flock of ewes constituting the source of young animals.

3. Horses.- The horses of Augusta County are principally farm work animals. There are 8,931 head, constituting only 2.1 per cent of the total number of livestock, or approximately 16 per cent of the total number of livestock units. They are distributed on an average of slightly more than two per one hundred acres or about four per farm. Ninety per cent are mature animals, which fact, together with their relatively sparse distribution, emphasizes their major function as work animals, and indicates that what breeding is carried on is primarily for the replacement of old stock.

The individual distributions of cattle and sheep units.- Cattle and sheep are of particular significance in Augusta County because they represent virtually the only commercial livestock rearing carried on. The patterns of their distribution follow the same longitudinal design noted with reference to the summarized pattern of rural land utilization with densities much in keeping with the associated uses of the land.

1. Cattle units.- The densities of cattle units range from less than one to twenty per one hundred acres (Fig. 7). There are, in general, three sub-divisions in the distribution. In one, the density is between twelve and twenty units per one hundred acres; in the second, there are from four to twelve units per unit area; and in the third, the densities range between less than one to four per unit area.

The first sub-division is made up of three sections.

The largest constitutes a belt about three miles wide and eighteen miles long that reaches from the northern county boundary, adjoining and east of Weyers Cave, to about three miles south of Waynesboro. It thus lies in the lower Middle and South river valleys. In the outer portions of this belt there are from twelve to sixteen cattle units per one hundred acres. In the inner portions, the density reaches twenty units per unit area.

This belt of land includes sections in which a high percentage of the land produces agriculturally. In the northern part the percentage reaches a maximum of nearly one hundred. The lower percentages occur along the eastern border of the belt where from 70 to 80 per cent of the land produces agriculturally. As was noted previously, most of this land is cropped, harvest land occupying on an average of about 65 per cent of the total area. Pasture land is prominent toward the northern part of the belt, but elsewhere small grains are the leading crop, with hay and corn land about equal. In the southern part of the belt, small grains occupy as much as 40 per cent of the land. In the northern part they occupy as low as 10 per cent of the land. In most areas, hay and corn occupy, combined, from 20 to 30 per cent of the land.

In this belt, the cattle units are about equally divided between beef and dairy stock (Fig. 6). The beef cattle are concentrated toward the north, outnumbering dairy cattle as much as ten to one. In the southern part, dairy cattle outnumber beef cattle as much as ten to one. The predominance of dairy cattle in the latter area is due, in large measure, to the location of Waynesboro in that area. Waynesboro constitutes both a consuming market and a point of concentration for dairy products for ship-

ment.

The other two sections in this sub-division lie to the west. In both of them the density of cattle units ranges from twelve to sixteen per unit area. One, a small area of about eight square miles, lies immediately east of Staunton. A high percentage of the land produces agriculturally. The harvest acreage is relatively large, being composed of relatively large acreages of hay and small grain and medium acreages of corn. Pastures occupy a medium amount of land. There are more than ten times as many dairy units as beef units in the area (Fig. 6). This is due, primarily, to the proximity of Staunton which, like Waynesboro, constitutes a consuming and a shipping center for dairy products.

The third section is in the west-central part of the major valley plain. It forms a belt about three miles wide and ten miles long that lies in upper Middle River Valley between Churchville and Middlebrook. Productive agricultural land occupies from medium to high percentages of the total area. It is about equally divided between pasture and harvest acreages. The leading crop is small grain, corn and hay ranking third and fourth, respectively. Beef cattle are predominant, ranging from one to five times the number of dairy cattle (Fig. 6).

In virtually all the rest of the major valley plain the density of cattle units ranges from four to twelve per one hundred acres (Fig. 7). The eastern and western isopleths of four units roughly follow the dividing line between the eastern and western belts of foothills and the major valley plain. The broad areas bounded by these two isopleths are about equally divided between densities of four to eight, and eight to twelve cattle units per one hundred acres. The lower densities occur, for the

most part, in the marginal zones, in the southern third of the area, and in two large sections in the Centerville-Spring Hill and Laurel Hill-New Hope vicinities. The marginal and southern portions include sections in which there are medium to low amounts of productive agricultural land. The harvest acreages are also relatively small. In the remaining two sections the amount of productive agricultural land is relatively large, and much of it is harvest land. Small grains predominate, with hay and corn occupying medium acreages. In the marginal areas beef and dairy cattle are approximately equal in number (Fig. 6). The beef cattle, obviously, are reared for commercial purposes, but the dairy cattle, particularly in the more remote sections, are used primarily for producing dairy supplies for home consumption. In the southern sections of the major valley plain the two types are again about equal in number, but unlike the marginal areas, they show marked concentrations. In the western parts of the area beef cattle outnumber dairy cattle as much as ten to one. These, it will be remembered, are outstanding pasture areas. In the eastern parts of the area, the ratio of beef to dairy cattle is just the reverse. These sections were noted previously as having prominent harvest acreages.

The remaining portions of the major valley plain have a density of from eight to twelve cattle units per one hundred acres. These densities are associated, in general, to medium amounts of productive agricultural land. Where pastures are prominent, for example in the marginal sections of this area, beef cattle outnumber dairy cattle (Fig. 6). In many sections the two types are about equal in number. In the vicinity of Staunton, and on both sides of the Valley Pike, dairying is much more important than the production of beef. The main factor in-

volved is the consuming and shipping functions of the town and the ease of transfer of fresh dairy supplies along the excellent roads of the immediate vicinity.

Small areas of similar densities occur in the minor valley plains. In Little Calf Pasture Valley there are from four to twelve cattle units per one hundred acres. The higher densities are in the lower sections where the productive acreage is relatively large. In the lower sections of Calf Pasture Valley the cattle density is from four to eight units per one hundred acres.

The sub-division of low densities, from zero to four cattle units per one hundred acres, is confined almost exclusively to the foothill areas and those sections of the minor valley plains that border the foothills (Fig. 7). The higher densities occur near the valley plains, the density decreasing to zero near the mountains. The low densities and their distribution are in keeping with the relatively small acreages of productive agricultural land, already noted, and the distribution of this land over the foothill areas. In this sub-division dairy cattle are slightly more numerous than beef cattle (Fig. 6). Again, the beef cattle are reared for commercial purposes and the others for producing dairy products mainly for home consumption.

2. Sheep units.- Sheep are rather densely distributed in the greater portion of the major valley plain, in some sections reaching maximums of nine units per one hundred acres (Fig. 8). In the marginal areas and in the foothills, the distribution is sparse, ranging from none in the vicinity of the mountain slopes to one unit along the borders of the valley plains. Three major sub-divisions stand out in the pattern of the distribution.

In one, made up of four sections, the densities range

from five to nine units per one hundred acres. One section forms a belt from one to four miles wide from the northern county boundary between Mt. Solon and Centerville to within a short distance of Middlebrook. Another covers an area of about twenty square miles between Verona Rolla and Mt. Sidney. These two sections have minimum and maximum densities of five and nine units per one hundred acres. The areas they cover have been noted as highly productive, with pasture acreages prominent and much of the land in hay and small grains. The last two sections, both with maximum densities of five units per one hundred acres, lie to the south and east. One covers an area of about forty square miles between Staunton, Fishersville, Stuarts Draft, and Middlebrook. The last is an eight-square-mile section immediately west of Spottswood. The productive agricultural acreages are as large in these two sections as in the first two, but the harvest acreages are slightly larger and the pasture acreages correspondingly smaller. Orchard fruit, obviously a non-livestock crop, is particularly prominent in the larger of the two areas, a very probable factor in the smaller number of sheep in these areas as compared to the first two. There are more cattle units than sheep units in all four of these sections, but with minor exceptions the sheep units outnumber the beef units about five to one. It will be remembered, in this connection, that these areas include sections in which dairy units outnumber beef units.

The second sub-division has a density of from one to five sheep units per one hundred acres (Fig. 8). It is made up of one very large area and two small areas. The large area fills in almost all that remains of the major valley plain. Its western isopleth of one unit per one hundred acres corresponds, in general, to the isopleth of 25 per cent harvest land, coming

south through Stokesville and Jennings Gap, but enclosing within the area the Little North Mountain section. The eastern isopleth of one unit per one hundred acres lies well within the eastern isopleth of 25 per cent harvest land. It follows South River for a short distance, and there swings westward through Fishersville, Stuarts Draft, Greenville, and Spottswood. In the marginal areas of this large area and in some minor sections well within the area, the density of sheep units ranges from one to three per one hundred acres. Elsewhere the density is between three and five. In the marginal areas to the west and south the relatively low densities are related to the slightly restricted acreages of productive agricultural land, but in the middle and eastern sections the relatively low densities are explained, in large part, by the prominence of non-livestock acreages and the use of livestock land for beef and dairy purposes (Fig. 5).

The two small sections that remain are located, one each, in the two Calf Pasture valleys. The section in Calf Pasture Valley covers about thirty square miles and has a maximum of five sheep units per one hundred acres. The Little Calf Pasture section covers about eight square miles and has a maximum density of only three units per unit area. The features of both valleys have been noted already in sufficient detail.

In nearly all parts of this sub-division there are as many sheep units as beef units. Where minor exceptions occur in the major valley plain, beef units, as a rule, outnumber sheep units five to one. Where minor exceptions occur in the minor valley plains the ratio is, as a rule, exactly the reverse.

In the last sub-division there is less than one sheep unit per one hundred acres (Fig. 7). Three sections make up the sub-division, a wide belt on each side of the major valley plain

that corresponds, roughly, with the foothill areas, and a small area in the vicinity of Staunton. The isopleths of one sheep unit per one hundred acres have already been noted on both sides of the major valley plain. These constitute one boundary of the areas under discussion. The other boundary is formed by the isopleth of zero units per one hundred acres. This isopleth corresponds to the isopleth of zero per cent productive agricultural land. Two belts are thus formed. One, averaging approximately four in width, lies along South River Valley and the bordering Blue Ridge foothills. The other, varying from one mile in width to the north to six or eight miles in width to the south, lies along the western belt of foothills. In the eastern belt beef units far outnumber sheep units, in most sections, more than ten times. In the western belt the distribution is about equally divided between the two. The items to which these distributions are related have already been noted in sufficient detail. The low density of sheep units in the Staunton area is related to the suburbanized nature of the area and to the prominence of dairying in the sections immediately surrounding the town.

Summary.- Through the treatment of the distributions of the major types of livestock, it is evident that the main factors involved are: (1) the amount of land producing agriculturally, and (2) the amount of agricultural land used for livestock crops and pasture. In other words, higher densities occur where a relatively large amount of land produces agriculturally, where the pasture acreages are relatively large, where the livestock crop acreages are relatively large, and where the two last combined constitute a relatively large amount of land. It also is evident that livestock rearing is of major importance in the county at least in terms of land used for that purpose.

The interest in this type of agriculture is, in large measure, a reflection of the qualities of the land that make possible the production of excellent bluegrass pastures and abundant hay. The importance of cattle and sheep, as compared to other types of livestock, is in keeping with these pasture and crop conditions. The relative proximity of densely peopled industrial areas in the Eastern Seaboard, not to mention the market possibilities of Staunton and Waynesboro, goes far toward providing an explanation for the attention paid commercial dairy farming in the cattle rearing phases of Augusta County agriculture. The sparse, though relatively even distribution of swine and poultry, indicates the subsistence nature of these types of livestock rearing and the relatively sparse distribution of horses reveals, in large measure, their primary function as farm work animals.

Section 5. The Productivity Of Agricultural Land¹

A Cross Section of the County in Terms of Productivity.-

Variations in the productivity of the agricultural land of Augusta County are apparent in the landscape, particularly if the observer is travelling across the county, for example, westward from Rockfish Gap along the Richmond-Monterey highway. In the foothills between the Blue Ridge and Waynesboro what little agricultural use is made of the land shows only meagre returns. Immediately west of Waynesboro the landscape presents a very different picture. As the summer progresses in that area the hay fields show luxuriant growth, wheat shocks are large and close together, the oats stands are heavy and the heads are full, the corn is dark green, and has sturdy stalks and well-set ears, the apple trees

¹The data covering production and livestock densities used in this chapter were obtained from individual census schedules covering the three sample farms in each of the seventy-five rectangles for which census data were obtainable.

show signs of a plentiful harvest, and the pastures provide rich feed for stock. In the vicinity of Fishersville the yields are perceptibly lower, but nevertheless, the countryside gives the impression of a high farm productivity. Immediately east of Staunton, particularly in the fields back from the road, the crop combinations and stands are comparable to those immediately west of Waynesboro. But west of Staunton the hay and wheat crops look less promising although, in general, the oats, corn, apples, and pastures are up to or above standard. East of Churchville hay and wheat again occur in fine stands, oats still maintain their heavy growth, but the corn is light. The apple orchards are productive, but not as highly so as the orchards west of Waynesboro. The pastures are luxuriant. Between Churchville and Jennings Gap there is a conspicuous decrease in the productivity of the land. Hay alone seems to maintain a good growth, but even it does not compare with the heavy stands observed west of Waynesboro. Only scattered bits of pastured or cropped land appear between Jennings Gap and Calf Pasture Valley. Quite obviously the land yields small returns. In Calf Pasture Valley the wheat looks good and the corn along the river bottom is fair, but the other crops and even the pastures show signs of the relatively unfavorable conditions for farming previously noted. Beyond lie the foothills of the Shenandoah, like those of the Blue Ridge, but little farmed or pastured, and quite evidently yielding meagre agricultural returns.

The Relative Productivity of Productive Agricultural Land.-

It is difficult, but not impossible, to express the yields of the land in numerical values. Corn, oats, and wheat yields can be distributed, rectangle by rectangle, in terms of the bushels harvested per acre. Hay yields can be distributed in terms of

tons per acre and apples in bushels per one hundred trees. This method serves for individual harvested crops. In order to combine the yields into composite figures for the purpose of describing the productivity of land from which crops were sold, the yield per acre of each crop for each rectangle were expressed in terms of how it compares with the yield for all rectangles in which that crop is grown. For example, if the average per acre yield of corn is forty bushels in all the rectangles and the yield in a given rectangle is sixty bushels, the latter can be expressed as 150 per cent of the average. The yields in each rectangle, thus expressed, can be combined in the form of an average for all crops, giving a numerical description of the relative productivity of each rectangle.¹ The productivity of pasture land presents a more difficult problem, but a figure approaching accuracy can be obtained by determining the density of livestock units per one hundred acres of land used for livestock rearing purposes. This, obviously, includes all pasture land and all livestock-crop acreages except those from which crops have been sold. Census materials give the amounts of crops sold, and by figuring back through per acre yields a satisfactory estimate of the number of crop-acres used for livestock is obtainable. In order to combine these figures with those of the harvest land, so that the relative productivity of productive agricultural land could be ascertained, the former were expressed in percentages, using the same method that was applied to crop yields. Again, the

¹Undoubtedly results that are more nearly accurate could be obtained if the various factors in each average computed were weighted. How much weight each of the factors should be given is unknown. The method used here, that is, giving all factors equal weight represents, therefore, a preliminary step that should be followed by additional experimentation.

simple averages were used (Fig. 9).¹

The pattern of the relative productivity of productive agricultural land is a summary in that it is based upon the averages of the figures representing the relative productivity of harvest land and the relative productivity of livestock-crop and pasture land. It is not absolutely accurate because undoubtedly some of the assumptions made were not wholly legitimate and because, ideally, the factors should be weighted. But it constitutes one objective means of arriving at a conception of the pattern of relative productivity that otherwise would have to be subjective. The legitimacy of the pattern, like others mentioned, is indicated by the coincidence between it and the distributions of factors that are involved, such as soils and topography, and by the fact that it is in close agreement with the careful field observations that were made. Five general sub-divisions of the county should be noted in the pattern (Fig. 9).

1. The sub-division of very high relative productivity, from 140 to 170 per cent consists of five sections. Three are quite small, averaging about six square miles each. One adjoins Weyers Cave and Mt. Sidney, a second lies immediately north of Crimora, and the third is about midway between Staunton and Fishersville (Fig. 1).

The remaining two areas of very high relative productivity each cover about thirty square miles in the east-central and west-central portions of the major valley plain. One surrounds Waynesboro and forms a belt that reaches almost to Stuarts Draft. In the neighborhood of Waynesboro the relative productivity of the land reaches a maximum of 200 per cent of

¹Ibid.

the average. The last section surrounds and connects Churchville and Swoope.

2. The sub-division of high relative productivity, from 110 to 140 per cent is made up of three sections. Two are of minor importance because of their small size. One forms a narrow band around the Churchville-Swoope section of higher relative productivity and the other covers about six square miles immediately west of Spottswood. The major area is a large portion of the eastern half of the major valley plain. The body of the area occupies the southern third of the northeast quadrant and the northern half of the southeast quadrant. A belt from two to three miles wide follows the Valley Pike from Staunton to the northern county boundary. Another, about four miles wide, occupies South River Valley, northward to within about four miles of the county boundary.

3. The major portion of the remaining sections of the eastern half of the valley plain and a large portion of the west-central part of the plain are combined into one sub-division in which the agricultural land produces to an approximate average degree, from 90 to 110 per cent. A minor section also occurs in the Mt. Solon neighborhood and another forms a belt around the Spottswood district. Generally speaking, then, all but narrow marginal areas in the two eastern quadrants, and all but roughly the northern and southern thirds and marginal areas of the two western quadrants have a relative productivity in terms of agricultural land that is average or better.

4. The relative productivity of the fourth sub-division is low, ranging from 60 to 90 per cent. It is made up of the exceptions noted in the preceding sub-division and a series of four relatively minor areas. One each lies in the Calf Pasture

valleys; one occupies a narrow belt between New Hope and Staunton; and the third covers about four square miles immediately east of the Valley Pike, midway between Greenville and Staunton.

5. The last sub-division has a relative productivity that is very low, ranging from zero to 60 per cent. The eastern section of this sub-division forms a narrow belt that coincides quite closely with the foothill sections of the Blue Ridge. The western section of the sub-division covers the western foothills and the portions of the minor valley plains that border the foothills.

Productivity and the Five Major Divisions of the County.-

The patterns of rural land utilization and those displaying the distribution of livestock furnished abundant evidence of the relative agricultural importance of the five major divisions of the county described in Section Four. The pattern showing the relative productivity of productive agricultural land adds sufficient evidence to leave no doubt as to the relative agricultural importance of these divisions. The first division, the non-agricultural forested mountains, can be disregarded in this connection. The woodland-pasture foothills division is distinctly low in productivity as compared to the remaining three divisions. Even the pasture-crop-woodlands division is below average, a fact that is indicated by the presence of woodlands in the combination of major land uses. The last two divisions stand out, as would be expected, as the more productive of the five. There is, however, an observable difference between the two. The pasture-crop rolling plain division is quite evidently less productive than the crop-pasture undulating plain division. It is about equally divided between land slightly below average, average, and slightly above average in productivity. Most of the land in the crop-

pasture undulating plain division, on the other hand, is average or better, and of these two classes, the latter covers slightly more area. The situation these patterns depict finds its expression in the relative prosperity of the various parts of the county, a matter that is treated in the following section.

Section 6. Farm Income And Wealth

The patterns treated in the foregoing chapters are summarized, to a large degree, in the patterns of farm income and wealth because the former are here expressed in terms of economic values. For example, incomes per acre involve the sources and the amounts of income. They thus include the factors of the use of the land and its products and the extent to which the land produces. Since the patterns of incomes per acre are based upon figures representing equal area units, that is, one acre of land, there is a high correlation between them and the patterns of the natural landscape just as there is between the latter and the patterns of land utilization, livestock densities, and productivity. There is not as high a correlation between the patterns of incomes per farm and the patterns of the natural landscape because farms vary in size. But farm incomes provide a better indication of farm wealth than per acre incomes because each farm constitutes an administrative unit, or, in other words, the endeavor of one operator. Other important indications of farm wealth than incomes per acre or per farm are the size of farms and the values placed on farm property -- dwellings, other buildings than dwellings, implements, and the land itself. The patterns which show the distribution of these items summarize the other patterns of farm income and wealth because they are, to a major extent, based upon the economic returns realized from the land.

The ease with which the sources of income can be observed in the landscape has been pointed out. It is equally as easy to see in the landscape the relative prosperity of various sections of the county. As before, so here, the things to be seen in the landscape, both cultural and natural, are united into a closely woven set of relationships and inter-relationships stimulating inquiry.

Some sections of the county are known locally for their agricultural prosperity and well being. In them the farms are medium to large in size or represent specialization on relatively small areas. Much, if not most of the farm land, produces agriculturally. The homes are comfortable, well constructed, and well kept. Some are spacious. The barns are large, substantial, and in good repair. Lawns and barnyards are large and clean. Gardens, both flower and vegetable, are conspicuous. One- or two-car garages stand near the dwellings. Telephone wires lead to the houses and electric light wires to the houses and barns. The fences around the farmsteads and the fields are strong and well kept. All these items and many others are evidence of prosperity and well being. That these sections are confined almost wholly to the major valley plain bespeaks the favorable conditions that this plain offers to agriculture. Their distribution within that area testifies to the variation in conditions, one section as compared to another.

Other sections are known locally for their relative lack of agricultural prosperity and well being. In them the farms are small or of medium size. Productive agricultural land constitutes only a relatively small portion of the farm acreage even on the few large farms. There is little or no specialization to counteract the small acreage in each unit. Most of the

homes are places to dwell, and little more. If they have ever been painted, the paint is now dull and faded, or is scaling off. Some homes are whitewashed. The barns are small, as a rule, and many of them have the appearance of makeshifts. The lawns are, for the most part, only open spaces around the houses -- not things of beauty. Few if any flowers add cheer or color to the farmsteads, and the kitchen gardens are small, and, in many cases, ill kept. Fences are absent or few, and are, in large measure, not well kept. Implements, showing signs of home repair, and perhaps an old car with a top or a wheel or two missing, stand in a barnyard that is cluttered with a mixture of articles now past usefulness. No electric wiring gives evidence of either light or telephone service. The casual traveller through the county scarcely ever sees these sections. Most of them are confined to the foothills and in the marginal sections of the major valley plain. Only a few are to be found in the valley plain itself. There are virtually none facing the main highways. Few are to be seen on paved roads. To reach them one must go into the back country or find his way along an infrequently used by-road to see them.

These are the two extremes. Between them is a great body of "middle class" farms that covers most of the land. As a whole, the county presents a picture of comfortable farm life with abundant problems, to be sure, but with ample resources in the nature of the land and in the nature of the people to partially, if not wholly, solve them. The people are, in large measure, descendants of sturdy, industrious Germans and Scotch-Irish who came into the country from the northern sections of the Great Valley. They knew the art of farming and had the temperament and ability to apply it. These characteristics have

been passed on to subsequent generations along with the land itself.

Incomes Per Acre.- The farmers of Augusta County have five major sources of income, namely: (1) crops sold or traded, (2) livestock sold or traded, (3) livestock products sold or traded, (4) farm products used by operators' families, and (5) forest products sold or traded. In amount of the economic return, the first source constitutes the most important, even though it has already been noted that the amount of land from which crops are sold is considerably less than the amount of land used for livestock rearing purposes. The income from the second two sources combined, is about equal to the income from crops sold or traded, but separately they rank as they are enumerated, second and third, respectively. Operators' families use a relatively small proportion of the total value of farm products, and forest products are still less important as a source of income. This relationship between the amounts realized from these five sources is brought out in a different way by the distribution of the ranks of the incomes in the seventy-five rectangles for which data were obtained. The localization of rectangles in which the ranks of a given income are comparable is in keeping with patterns treated in the foregoing chapters. For example, in most parts of the eastern half of the major valley plain, first rank is held by the income from crops sold or traded. In the northern part of the same portion of the plain, second rank is held by the income from livestock sales and trades. The income from livestock products is second in rank in the central part of the area. In the southern part, the second, third, and fourth sources are all represented.

The pattern of total per acre incomes summarizes the distributions of these individual incomes and lays a foundation

for the understanding of farm values. The major valley plain stands out, as would be expected, as the area of higher incomes (Fig. 10). Medium to low incomes are realized in the margins of the major plain and in the two minor valley plains. The lower incomes occur in the foothill sections. The main factors in the distribution of these values are: (1) the amount of productive agricultural land, (2) the amount of harvest land, (3) the type of crops cultivated, and (4) the degree to which specialized farming or livestock rearing is conducted on a commercial scale.

Within the major valley plain the higher incomes are realized across the central sections of the county from Waynesboro to Churchville. The range of incomes in these areas is from twenty to nearly seventy dollars an acre. The larger amounts occur in the commercial orchard sections around Waynesboro and Churchville, and the dairy sections immediately east and west of Staunton. The lower values are obtained in the grain and livestock areas. In the northern part of the major valley plain the per acre income varies from ten to nearly twenty-five dollars, the higher amounts occurring around and south of Weyers Cave and on the east side of South River. Crops and livestock products account, in large measure, for the higher incomes in these areas. The southern sections of the major valley plain have incomes of from ten to twenty dollars an acre. The prominence of livestock rearing in the central sections explains, to a great extent, the localization of higher incomes in that area.

The incomes in the minor valley plains, and in the marginal zones of the major valley plain, range from five to ten dollars an acre with the higher values occurring in the sections near and in the valley plain areas. In the foothills the range is from zero along the mountain slopes to five dollars an acre

on the lower foothill areas.

Incomes Per Farm.- The per farm incomes from all sources show a decided range (Fig. 11). In the lower Calf Pasture Valley the amount is between two and three hundred dollars. In the south-central section are farms that bring in more than fourteen thousand dollars each. Several factors are involved in the distribution of these incomes. The more important are: (1) the nature of the land, (2) the type of agriculture carried on, and (3) the size of the farms.

The incomes per farm in the major valley plain are in the upper brackets. In a large part of the area they range from \$3,000 to \$6,000, the sections thus classified being, in general, the middle third of the eastern half of the major valley plain, the major portion of the northeast quadrant, and the eastern portions of the western half of the major valley plain. Incomes of more than \$6,000 per farm occur in four minor sections within these areas. Between Waynesboro and Stuarts Draft they are from \$6,000 to \$9,000. The same holds for a section north of Churchville. Between Churchville and Swoope the figure reaches a maximum of nearly \$13,000, whereas, immediately south of Middlebrook the income per farm is slightly more than \$14,000.

In the southern and marginal areas of the major valley plain, and in minor sections in the central and northern parts of the plain, the incomes amount to between \$2,000 and \$3,000 per farm. The incomes in the minor valley plains and foothills range from around \$3,000 to slightly more than \$2,000 per farm with the lower figures occurring, for the most part, near the mountains.

Farm Values.- The distribution of total farm values summarizes virtually all of the items previously indicated (Fig. 12).

For example, total farm values are relatively high in areas in which a large percentage of the land produces agriculturally and to a relatively high degree, the incomes per acre and per farm are relatively large, and farm values are above the average. A good example is to be found in the east-central part of the major valley plain. Reaching from Staunton to Waynesboro and extending north and south of the Richmond-Monterey highway is an area of approximately one hundred square miles in which farm values range from \$23,000 to \$35,000. It will be remembered that most of the land in this area produces agriculturally and to a relatively high degree. Some specialization in the form of commercial and semi-commercial orchard and dairy farming is carried on in the area. The per acre and per farm incomes are relatively high in most parts of the area, as are, also, the values of individual items of farm property. In term of physical setting, the area has been noted as including considerable sections of relatively level to gently rolling land and soils that are, in most cases, among the more productive of the soils of the county.

Comparable, though not necessarily duplicated circumstances are to be found in the western half of the major valley plain. Stretching south from the Mt. Solon-Centerville neighborhood almost to the southern county boundary beyond Middlebrook is a belt of land from two to six miles wide in which total farm values are, in most cases, from \$20,000 to \$30,000. In two minor sections, one north of Churchville and the other north of Middlebrook, total farm values reach maximums of \$33,000 and \$36,000, respectively. South of Middlebrook is a minor section that has an average farm value of slightly more than \$45,000.

The values of farms in nearly all the remaining portions of the valley plain, in Little Calf Pasture Valley, and in a

small section of Calf Pasture Valley, range from \$10,000 to \$20,000. In the areas toward the south the values are in the lower brackets, in some cases falling below \$10,000. Toward the north the values are in the higher brackets, reaching as much as \$32,000 between Spring Hill and the Valley Pike, and \$25,000 in the Middle and South River valleys near the northern county boundary.

The values of farms in the foothills and in the major portion of Calf Pasture Valley fall below the \$10,000 class. In the eastern foothills the farms are valued rather near \$10,000, but in the western foothills, particularly around Calf Pasture Valley, they are valued as low as \$2,200.

Section 7. Patterns Of Urban Land Utilization

The pattern of urban land utilization of Augusta County is made up of two cities, Staunton and Waynesboro, and twenty villages (Figs. 1 and 2). Staunton, the larger city, is primarily a "county" town, but its economic, social, and even its political functions and influences at times and in certain respects reach beyond the confines of the county. The diverse industrial activities of Waynesboro take it into regional and inter-regional affairs. Although in certain ways its commercial activities reach across the Blue Ridge, it functions, nevertheless, primarily as a "local" town, serving nearby rural communities. The villages are of rural significance serving the local church, school, and simple day to day commercial needs of their immediate communities. Three villages, Augusta Springs, Craigsville, and Fordwick, constitute exceptions. In each of the first two is a small silk spinning mill. The last is centered around a Lehigh-Portland Cement Company plant. The analysis of these twenty villages adds relatively little to the understanding of the rural areas built

up in the foregoing pages.¹

Staunton, the County Seat.- Staunton is the commercial, social, and political center of Augusta County. Its population of 11,990 is composed of a typical American mixture of retired farmers and land owners, professional and business men, a few small manufacturers, artisans, laborers, and their families. The pattern formed by the city of Staunton is in large measure an expression of: (1) the activities of these people, (2) the daily, weekly, and seasonal rhythms followed by these activities, (3) the importance of Staunton to the county, and (4) the importance of the commercial and political functions of the town to the people that live there. The city limits form a crude octagon enclosing a little over four square miles (Fig. 13). Within this area are seven distinct hills that rise from one to two hundred feet above their intervening valleys. These hills and valleys converge on the central section of the city where they meet on the narrow, relatively level flood plain of Lewis Creek.

The pattern that occupies this site has six outstanding characteristics: (1) the simple grid design held by the street pattern in spite of the "seven hills" (and seven valleys) of the city's site; (2) the concentration of business and commercial activities along Augusta Street and the Chesapeake and Ohio tracks on the narrow flood plain of Lewis Creek; (3) the close association of older residential areas with the business district and with the two major streets, Augusta and Beverly; (4) the location of most of the churches and most of the schools, both private and public, within the older residential areas; (5) the occurrence of

¹They are, therefore, not treated in this abridgement of the complete study.

many areas not completely settled around the margins of the city; and (6) the absence of any marked signs of manufactural activities. The last is, for the most part, true to the personality of the town, for it is a residential and commercial center, not an industrial center.

The key to Staunton's importance and many of its other features is to be found in the establishments that make up the city's business district and the pattern of their arrangement. The district takes the form of a crude, inverted "T" (Fig. 13). The bar of the letter lies along the north side of the Chesapeake and Ohio tracks. The eastern section extends for approximately four blocks east of Augusta Street along Johnson Street and Greenville Avenue, streets that are portions of the Valley Pike and the Richmond-Monterey highway. The western section of the cross bar is about six blocks long. It lies on both sides of Middlebrook Avenue, part of the Middlebrook Pike. The stem of the inverted "T" extends north from the C. and O. station for about eight blocks along and immediately west of Augusta Street. Four sections stand out in this inverted "T" shaped area, namely, (1) the wholesale and warehouse section, (2) the small manufacturing and repair section, (3) the mixed business and residential section, and (4) the retail-office section. The first three are in marginal areas of the business district and are associated with one or more of the major highways that lead into the central area of the city.

The retail-office section is the "heart" of the city. It extends one block south and two blocks north of Beverly on Augusta Street and two blocks east and two west of Augusta on Beverly Street, covering, thus, approximately twelve square blocks.

Viewed in its larger aspects, Staunton's business dis-

trict has five localizations sufficiently distinct and important to be noteworthy. First, at and immediately surrounding the intersection of the two major thoroughfares, Augusta and Beverly streets, are concentrated financial institutions, offices, and retail establishments that deal in compact, relatively high value commodity units such as shoes, drugs, clothing, and jewelry. Second, adjoining this inner section is a narrow, irregular area in which there are no financial institutions, only a few offices, several establishments rendering personal services, a number of retail establishments like those above, but also a relatively large number that deal in less compact, larger sized commodity units such as groceries, hardware, and furniture. The establishments thus far included either serve urban and rural needs alike or cater primarily to urban trade. Third, the county court house and its associated public and professional offices constitutes a distinct non-commercial, communal center. Fourth, in the marginal areas of the business district, primarily to the south and southwest, are gathered those establishments that deal, for the most part, in low and medium priced, large sized commodity units such as feed, farm implements, and automobiles, and render light manufacturing and repair services such as tinshops, creameries, printing establishments, and garages. The establishments in these two areas either serve urban and rural needs alike or cater primarily to rural trade. Fifth, immediately adjoining the last area on the southwest is a small wholesale, supply, and warehouse district typified by wholesale grocery houses, lumber and coal companies and dealers in junk and scrap iron. These establishments handle some urban and rural trade, but their primary function is to serve the needs of retail dealers throughout the county. These establishments, together with those of the inner sections of the

business district and the county court house, emphasize the county-wide political and commercial functions of Staunton, giving the city its "county" personality.

Waynesboro, the Industrial Town.- To one accustomed to thinking of the Valley towns of Virginia as quiet, rural hamlets, Waynesboro promises a bit of a surprise. Coming from the east along the Richmond-Monterey highway, the traveller catches his first glimpse of Waynesboro when he tops the crest of the Blue Ridge (Fig. 1). In that short glimpse and in the views he has of the valley plain as he descends to the foot of the Ridge, he will be struck by the breadth of the town, the winding river that cuts through its center, and the number and generous proportions of the manufacturing establishments (Fig. 14).

The municipal limits of Waynesboro form a crude, quite irregular polygon, slightly longer from east to west than from north to south, and enclosing about six square miles. Over this area is laid a street pattern of simple grid design that is roughly oriented to the cardinal points of the compass. This pattern is divided into eastern and western halves by South River and its narrow river front sections. The three divisions thus created, the two halves and the river front, are quite distinct and yet very closely related. The distinctive character of the first two is due to three major facts: (1) until 1923 each was a separate municipality, the area west of the river being Waynesboro, and that east of the river being Basic City;¹ (2) Old Waynesboro was organized and officially recognized as a municipality approximately one hundred years before Old Basic

¹The area east of South River will be referred to from now on as Old Basic City and the area west of South River will be designated by the name, Old Waynesboro. The name Waynesboro will be used as it is today, to designate the modern municipality.

City was incorporated; and (3) the two areas are definitely separated by the river front sections. These two areas are distinct from the river front sections in that they are primarily residential, whereas the latter is almost completely manufacturing. This feature of the river front sections is the major factor in the unification of the three divisions. It is in the factories along the river front that by far the greater portion of the wage earners of Waynesboro find employment.

Old Basic City.- Two major railroads serve Waynesboro meeting at right angles near the center of Old Basic City (Fig. 14). The Chesapeake and Ohio divides the entire town of Waynesboro into northern and southern halves and the Norfolk and Western divides Old Basic City into eastern and western halves. Five sections stand out in the latter urban unit, namely, a minor business district near the center of the area, and four residential segments created by the pattern of the intersecting railroads. The intersection of these two railroads is virtually the only excuse for the occurrence of a business district, as such, in the center of Old Basic City. Without the drawing power of the stations the district would probably soon be little more than a neighborhood store and gasoline station. As it is, the stores extend for only a block north and south on the east side of Commerce Avenue, the street that lies adjoining and parallel to the Norfolk and Western right of way.

The four segments into which the two railroad lines divide Old Basic City vary greatly in size. The southeast, southwest, and northwest segments each cover approximately twenty-five square blocks. The northeast segment approaches the combined area of the other three. Otherwise they are much alike. Near the business district the streets are faced by series of widely spaced,

relatively old, good quality homes, surrounded by ample, wooded lawns and interspersed by kitchen gardens, pastures, and vacant lots. Away from the business district the homes are farther apart, pastures are larger, and some land is used for farm crops. In the northeastern and southeastern outskirts of the town are small settlements of relatively old, inferior homes.

Old Waynesboro.- Old Waynesboro is composed of two distinct types of areas, namely, residential areas and a business district (Fig. 14). Main Street passes through the middle of the first and divides the latter into two approximately equal parts, the northern area and the southern area.

The business district of Waynesboro is located in the east central part of Old Waynesboro. The small size of the business district, the occurrence of residences within less than a block of the center of the district, the predominance of small retail establishments, the relative absence of offices, wholesale houses and storage warehouses, and the relative absence of congestion in the streets and on the sidewalks at all times of the day, -- all of these features point to the "local" nature of the business activities of Waynesboro as compared to the "county" character of the activities of Staunton and help to explain the marked difference in the tempo and rhythm of activities that characterizes each town. In pattern, forms, and functions Waynesboro's business district is drawn on a smaller scale, in comparison to the business district of Staunton, than is in keeping with the relative populations of the two urban areas. All of which merely points in another way to the relative commercial importance of the two towns.

The residential areas of Old Waynesboro cover about one hundred square blocks. Only about one half this area, the sec-

tions adjoining the river and Main Street, is occupied by residences. The remainder is farm and vacant land (Fig. 14). Kitchen gardens, chicken yards, and vacant lots occur in all parts of the residential districts, but only in the marginal sections are they as conspicuous as they are in Old Basic City. South of Main Street the area within three or four blocks of the business district contains some of the oldest and finest homes in Waynesboro and many modern homes of superior quality. With minor exception the remaining homes of Old Waynesboro are all of good quality.

The river front sections of Waynesboro.- Without its river front sections Waynesboro would consist of these two loosely joined residential areas, -- different in organization, in appearance, and historical background. But with them the entire, otherwise disunited, sprawling town is drawn together by common interests. In the factories located in these sections probably half the homes of Waynesboro have their direct source of income and many more their indirect source.

The river front sections lie in narrow bands on both sides of South River from the southern to the northern limits of the town (Fig. 14). They cover, thus, the immediate flood plain of the river. Some sections are slightly lower than others and may, during spring and winter flood periods, be covered with water, but most sections lie sufficiently above the river level to be free from floods except perhaps once or twice in a decade. Principally because of the low nature of the river front sections, residential and business uses have not encroached upon them, and for many years after the town was settled they remained relatively idle. Their value was low. Then came the factories. Cheap lands near the town and near railroad facilities were desired. The river front sections met these requirements.

When this study was made in the autumn of 1933, there were fifteen manufactural establishments in operation in Waynesboro. Ranked according to the number of employees, they constitute four groups as follows: (1) three textile plants, (2) seven plants making wood products, (3) four food manufacturing and processing plants, and (4) one plant producing iron and steel goods. Only seven of these plants are located in river front sections, but these seven employ approximately 70 per cent of the industrial wage earners of Waynesboro. It is because of this fact that the river sections are described as the unifying force of Waynesboro.

Keys to industrial development.- Granting the factors of a reliable, native labor group, convenient location between raw materials and markets, relatively cheap building sites, and a pleasant climate favorable to industrial activity and to low cost living, -- all of which apply equally well to almost any town in the Shenandoah Valley, the distinctive keys to the industrial development of Waynesboro are two, namely, water and railroads. The water factor appears in the form of South River and local springs, the first of primary importance to nearly all industries, and the second of primary importance to two major plants, the Du Pont Rayon Company plant and the Crompton-Shenandoah Company plant. The factor of railroad transportation is of even greater importance than the factor of water. No other town of the Valley is so fortunately supplied. No other town has both east-west and north-south main lines serving it. Future developments are uncertain, but with ample facilities still available, and with the decentralization of industry promised, it seems reasonable to believe that Waynesboro's best days are ahead.

Section 8. Findings And Conclusions

The findings and conclusions of this investigation divide into two groups. Group one deals with the patterns studied, and group two deals with the methods and techniques employed.

Group I. Findings And Conclusions Dealing With Patterns

The findings and conclusions dealing with patterns are centered around the thirteen patterns presented in the foregoing pages, but it should be understood that they are based on the eighty-nine patterns included in the complete manuscript. As presented here the findings and conclusions are classified under the four major aspects of land utilization in the county.

Uses Made of Rural Areas.- The outstanding importance of agriculture in Augusta County is demonstrated by two patterns dealing with the uses made of rural areas.

1. A summarized pattern of rural land utilization.- The summarized pattern of rural land utilization (Fig. 4) brings out two major characteristics of the county, namely, the striking simplicity of the agricultural pattern and its close adherence to the longitudinal grain of the county. The former is indicated by the five well-defined divisions. The latter indicates the primary importance of topography and the secondary importance of soils in the broader uses of the land. When compared with the patterns of population and transportation the summarized pattern of rural land utilization displays the close correlation that holds between the intensity with which rural land is used, the density of population, and the spacing of highways.

With specific reference to pasture land Figure Four shows:

- (1) that, taking the county as a whole, pasture land is more important than harvest land;
- (2) that pasture land is of outstanding importance in the plains of the minor valleys and in the marginal and

western portions of the major valley plain, whereas, it is of minor importance in the eastern portion of the major valley plain;

- (3) that pasture land is closely associated with woodland areas, with rolling to hilly land, and with soil types that are coarse, comparatively low in fertility, or not well adapted to cultivation;
- (4) that pasture land, in its distribution, indicates the areal extent of land used for rearing livestock and partially explains the distribution of population, the irregularities in the transportation pattern, the relative intensity with which the land is used, the variations in the size of land holdings, and the relative prosperity of various parts of the county; and
- (5) that, taking the county as a whole, pasture land represents a wise adjustment to the natural resources of the area.

With reference to crop land Figure Four points to:

- (1) the close relationship between the use of land for crops and the occurrence of relatively level to gently rolling land and fine-textured, relatively fertile soils;
- (2) the primary importance of topography and the secondary importance of soils in the distribution of crop land;
- (3) the relative unimportance of livestock rearing in the eastern portion of the valley plain in terms of area given to that purpose;
- (4) the close association of crop land with population densities, with closely spaced highways, with the intensive use of land, with comparatively small land holdings, and with relative agricultural prosperity; and
- (5) the effective use that is being made to the resources of the area.

With reference to non-agricultural land Figure Four shows conclusively that Augusta County is of major importance as a watershed and timber area in the Shenandoah River system and that the segregation of these areas from the predominantly agricultural portions of the county should make for the effective use and efficient administration of both types of land.

2. The distribution and relative density of livestock units.- The pattern showing the distribution and relative density of livestock units (Fig. 6) contributes two important concepts

concerning the uses of rural areas of Augusta County, namely, it shows the relative importance of types of livestock in the county as a whole, and their relative importance in various parts of the county. Stated specifically the facts are these:

- (1) that cattle rearing is the major livestock industry;
- (2) that the rearing of cattle for dairy purposes is of slightly more importance than their rearing for beef purposes;
- (3) that the rearing of dairy cattle is carried on for subsistence purposes in some parts of the county;
- (4) that subsistence dairying is related to the less favored portions of the county, and commercial and semi-commercial dairying is related to the more favored portions;
- (5) that the rearing of beef cattle is related to pasture land areas and dairy cattle to harvest land areas;
- (6) that the rearing of sheep holds second rank in the livestock rearing industry; and
- (7) that in the main, an effective use is being made of the resources of the land.

Returns from the Land in Terms of Agricultural Products.-

The returns from the land in terms of agricultural products are summarized in one pattern, namely, the pattern of the relative productivity of productive agricultural land (Fig. 9). The more important items presented by this pattern are:

- (1) the low relative productivity of the woodland-pasture foothills division;
- (2) the medium relative productive pasture-crop-woodlands division;
- (3) the high relative productivity of the pasture-crop rolling plain division, and the crop-pasture undulating plain division; and
- (4) the additional evidence that, in most cases, the land resources of the area are used wisely.

The Returns from the Land in Terms of Farm Income and

Wealth.- The returns from the land in terms of farm income and wealth are presented in three patterns, namely, the distribution

pattern of incomes from all sources (dollars per acre), the distribution pattern of income from all sources (dollars per farm), and the distribution pattern of total values of farm property (hundreds of dollars per farm). The first two, Figures 10 and 11, respectively, are very much alike in the items they emphasize. Both demonstrate the intimate relationship between income, the uses of the land, and the physical features of the land. Both emphasize the relative absence of economic prosperity in the foothill and minor valley areas and the relatively high economic prosperity of the major valley plain.

The third pattern, Figure 12, unquestionably constitutes a summary of virtually all of the patterns that deal with the agricultural use of land in Augusta County. As a summary it emphasizes the following major points:

- (1) the simplicity and the longitudinal arrangement of the agricultural pattern;
- (2) the varying inter-relationships between the uses of the land;
- (3) the intimate inter-relationships between the uses of the land and farm income and wealth;
- (4) the close inter-relationships between the agricultural pattern, farm income and wealth, the distribution of population, and the transportation pattern;
- (5) the direct relationships between the items listed in (4) and the uses made of the products of the land;
- (6) the intimate relationships between the major cultural and physical features of the landscape;
- (7) the evident agricultural wealth and prosperity of the county as a whole;
- (8) the relative prosperity of various parts of the county;
- (9) the conclusion that in most parts of the county, particularly the major valley plain, a wise use is being made of the natural resources of the area;
- (10) the questionable advisability of continuing the present agricultural use of the foothill and the minor valley plain sections, the probable advisability of discon-

tinuing all agricultural use of these areas except where conditions are peculiarly well suited to specific types of agriculture, and the unquestionable need for detailed studies looking toward definite readjustments in the use of these areas; and

- (11) the probable advisability of using the foothill, minor valley, and mountain sections strictly as watershed, timber, and recreational areas.

Uses Made of Urban Areas.- The findings and conclusions concerning the uses made of urban areas are based on the reconnaissance surveys of Staunton and Waynesboro.

1. Staunton.- The major conclusion with reference to Staunton is that it is the commercial, social, and political center of Augusta County and that the performance of these functions there is logical. This is revealed by the following major facts (Fig. 13):

- (1) its location in the center of the county;
- (2) its location at the county's major highway focal point;
- (3) its relatively large population representing nearly a fourth of the county's population;
- (4) the relatively large size of its business district;
- (5) the diversity of commercial and professional services it renders;
- (6) the concentration there of nearly all the county's wholesale establishments and company warehouses;
- (7) the location there of several regional communal and institutional establishments such as the grounds of the Shenandoah Valley Fair and the county court house; and
- (8) the relatively large areas occupied by good quality homes, both old and recently built, and the relative absence of inferior homes.

Waynesboro.- Waynesboro's local importance in terms of its commercial, social, and political functions is indicated by, for example, its small business district, the absence of wholesale concerns, and the comparative lack of communal and institutional establishments other than local (Fig. 14). The fact that these

functions are concentrated on the west side of the river gives that part of the town functional distinctions that emphasize the physical division made by the river in the town's pattern. To counterbalance this division there are located in the band-like river front sections the more important six of Waynesboro's fifteen factories. Since they employ or give indirect support to a large portion of the local population they constitute a unifying force in the town's activities and, to a degree, draw the two parts of the pattern together.

Although of local functional importance in the above respects, Waynesboro attains regional significance in industrial functions. This is demonstrated by:

- (1) the number of manufactural plants, fifteen;
- (2) the fact that most of the plants are significant in size;
- (3) the diversity of the plants, including the making of iron, steel, wood, and textile products;
- (4) the large proportion of the town's population that realizes its direct and indirect income from the manufactural plants; and
- (5) the large number of good quality but relatively small residences and home sites.

The major factors that help to explain the regional importance of Waynesboro's industrial functions are:

- (1) a climate that encourages industrial activity and lowers costs of living;
- (2) an adequate supply of reliable, native labor;
- (3) a midway location between older industrial areas to the north and newer industrial areas to the south that is particularly advantageous in decentralized factory systems;
- (4) excellent railroad connections to the east, west, north, and south over the Norfolk and Western and Chesapeake and Ohio;
- (5) excellent highway connections east and west on the Richmond-Monterey Highway and, via it, north and

south on the Valley Pike; and

- (6) adequate water facilities particularly well adapted to specialized processes in terms of water for use in the factories and for use in the disposal of wastes.

Group 2. Findings And Conclusions Dealing With
Methods Of Research.

An Evaluation of the Methods Used.- The size and nature of the area selected, and the resources that were available precluded the strict application of the fractional and certain other detailed methods. The problems relative to research methods thus became: (1) how could these methods be modified to meet the requirements of the study, (2) what new methods could be devised that would permit a maximum amount of detail investigation, and (3) on how large a scale could the study be carried forward without endangering the accuracy or reliability of the work and without sacrificing any essential details. In evaluating the methods, then, two major questions arise, namely: (1) do the methods permit a maximum amount of detailed investigation in relation to the size of the area and available resources, and (2) was the area selected too large, endangering the accuracy or reliability of the work and sacrificing essential details.

1. The amount of detailed investigation. It is relatively impossible to determine whether or not the maximum amount of detailed investigation was attained. There is conclusive evidence, however, that the amount obtained is more than adequate in terms of the scale of operations adopted. Major items that should be noted are:

- (1) each of the rectangles into which the county was divided covered ten square miles, an area small enough, in terms of the agricultural pattern of the county, to provide data sufficiently detailed to bring out not only the uses of the land but the efficacy of the uses to which it is put;

- (2) the entire county was included in the study: (a) nearly 90 per cent of the county was covered by sample field measurements, (b) approximately 75 per cent was covered by sample census data, and (c) the areas not covered by either (a) or (b) were covered by field observations;
- (3) the field measurements were in the form of traverses, a form of geographic research that has already proven its worth, and the sample census data, in most cases, covered not less than 10 per cent of the rectangle it represented, a sample sufficiently large to promise reliability;
- (4) the data obtained concerned all major forms of rural land utilization, livestock densities, agricultural and financial income, and farm wealth;
- (5) urban areas were studied in sufficient detail to reveal the major features of their patterns, the major commercial, industrial, social, and political functions they performed, the efficacy with which the land was used and the services rendered, and their major maladjustments; and
- (6) in all cases the data were sufficiently detailed to demonstrate the relationships that existed between the uses made of the land and their physical settings.

2. Accuracy and reliability. A true test of the accuracy and reliability of the methods used would involve a large amount of statistical work, or the detailed mapping of a large portion of the county, or both, -- a task larger in proportions than this study. Without this definite proof there still remains sufficient evidence in the study itself to warrant the assertion that for the scale of operations adopted the results are strikingly reliable. Three points, mentioned previously, should be noted again:

- (1) the high degree of coincidence in the areal distribution of closely associated items;
- (2) the high degree of coincidence in the areal distribution of identical items, one distribution based on field measurements, and one on census data; and
- (3) the failure to find significant discrepancies when the results of field measurements and census data were checked against field observations.

The Place This Type of Research Has in the Field of Geography.- One of the major good qualities of the methods employed in this study is that they are not entirely new, but represent, to a considerable degree, modifications and new applications of a series of well established tools of geographic research including the reconnaissance, the traverse, and the isopleth. The modifications and new applications removed much of the qualitative aspects of these methods, whereas their quantitative aspects were strengthened and applied on a scale heretofore impossible.

The need for these modifications and new applications has been appreciated primarily only since the more detailed methods were developed and thoroughly tested. In this sense, then, the experiment carried forward here is both appropriate and timely. Refinements should and undoubtedly will be made. In their present form, the techniques offered here constitute only the beginning of the bridge that should span the valley from the qualitative reconnaissance of large areas to the very detailed study of relatively small areas.

This experiment is appropriate and timely in another sense. With the national point of view pointing toward a more united effort relative to the effective use of resources, there is a growing need for methods of geographic research that have the accuracy and reliability of the quantitative approach, but at the same time strike for findings and conclusions of major significance and covering large areas. The methods herein employed should be valuable in such undertakings. They should not supplant the more detailed methods in all situations. Their major utility lies in their ability to throw into relief accurately and in a relatively short time the larger aspects of a given area

upon the basis of which plans of action can legitimately be inaugurated. In doing so they will bring forward the phases or features of the area that should be studied in more detail. The expense saved in time and money would be great, but yet smaller than the savings in terms of the attainment of the objective desired.

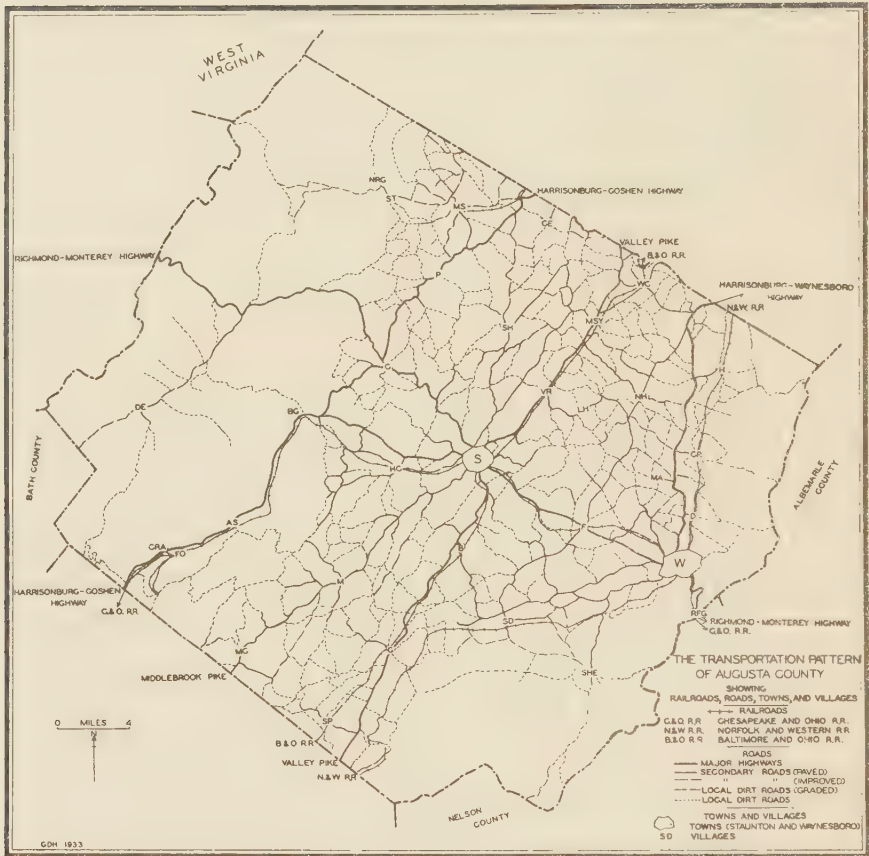


Fig. 1.- The transportation pattern of Augusta County. The transportation pattern of the major valley plain forms a closely woven web from which straggling threads stretch into the foot-hills and valleys. Staunton and Waynesboro, respectively, constitute primary and secondary focal points, the railroads and major highways forming the major radii and the paved secondary roads the minor radii. Dirt roads complete the pattern by forming the cross strands of the web. The following points are indicated: Staunton (S), Waynesboro (W), Brookewood (B), Buffalo Gap (BG), Centerville (CE), Churchville (C), Craigsville (CRA), Crimora (CR), Deerfield (DE), Doams (D), Fishersville (F), Fordwick (FO), Greenville (G), Harriston (H), Hebron Church (HC), Laurel Hill (LH), Lyndhurst (L), Madrid (MA), Middlebrook (M), Moffetts Creek (MC), Mt. Sidney (MSY), Mt. Solon (MS), New Hope (NH), North River Gap (NRG), Parnassus (P), Rockfish Gap (RFG), Sherando (SHE), Spring Hill (SH), Spottswood (SF), Stokesville (ST), Stuarts Draft (SD), Verona Rolla (VR), Weyers Cave (WC).

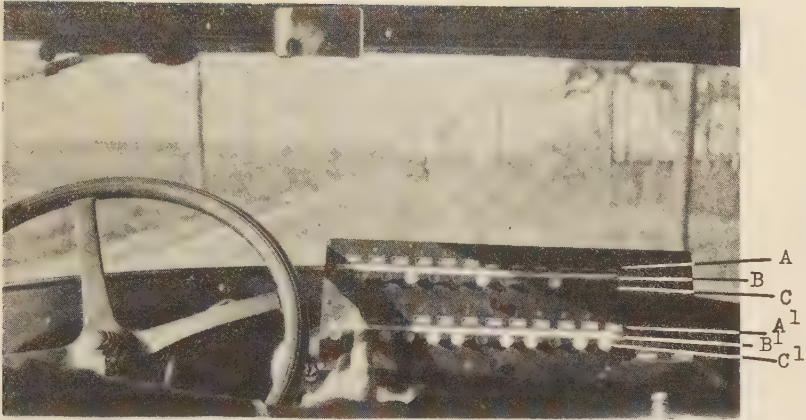


Fig. 2.- A double-drop-frontage-meter in operation. This meter is attached to the dash of the operator's car and powered by the same transmission unit that operates the car's speedometer. The cable leading to this unit appears at the lower right hand corner of the meter. This meter is double in that it measures simultaneously, the distances that types of land utilization or other landscape phenomena front on both sides of the road. This is accomplished by having two sets of dials on which distances are recorded (A and A¹), two rows of name plates that indicate the phenomenon tabulated by each dial (B and B¹), and two rows of buttons, each of which control the action of its accompanying dial (C and C¹). At the moment that the car passes a division line between two phenomena, for example, pasture land and corn land, the button representing the one ahead is engaged, throwing all other buttons idle, including the one previously engaged for the phenomenon just left behind. A number of checks are provided. The dial in the lower right hand corner of the meter registers without manipulation the total distances travelled. The number of miles recorded there should check with the total registered by each set of dials and should itself check with the car's speedometer.

An average of approximately twenty miles per hour can be maintained in rural areas if the pattern of the phenomena being recorded is not too complex. At times the speed must be reduced to seven to ten miles per hour. At other times maximum speeds of fifty miles per hour can be attained. The road frontages thus obtained are tabulated in into the form of traverses and act as samples upon the basis of which the distributions of phenomena are determined. Measurements for both sides of the road instead of one, increase the sample and thus reduce error.

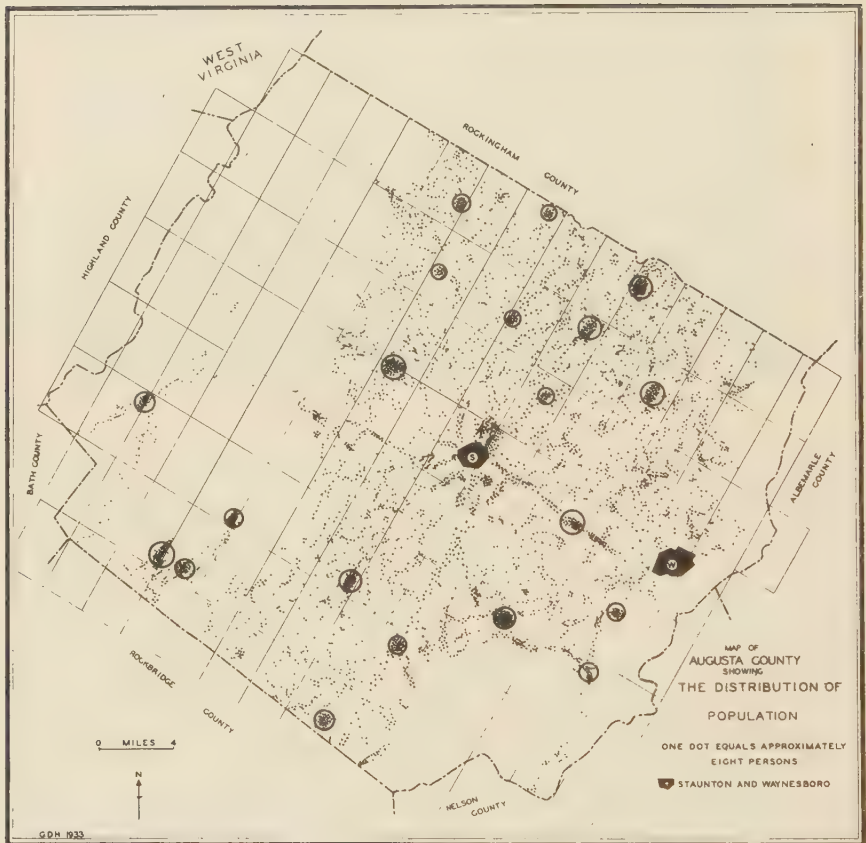


Fig. 3.- The distribution of population. Outside of the two major concentration points, Staunton and Waynesboro, the body of the population pattern of Augusta County is made up of major and minor alignments, most of which converge on Staunton, and major and minor clusters that, in large measure, form a crude circle each segment of which, is from eight to ten miles from Staunton. Beyond this circle, habitation pushes into the foothills to the east and to the west and stretches north and south to meet the populated areas of adjoining valley counties. The cluster farthest west stands very much alone, but the connections of those to the southwest relate them distinctly to Rockbridge County on the south.

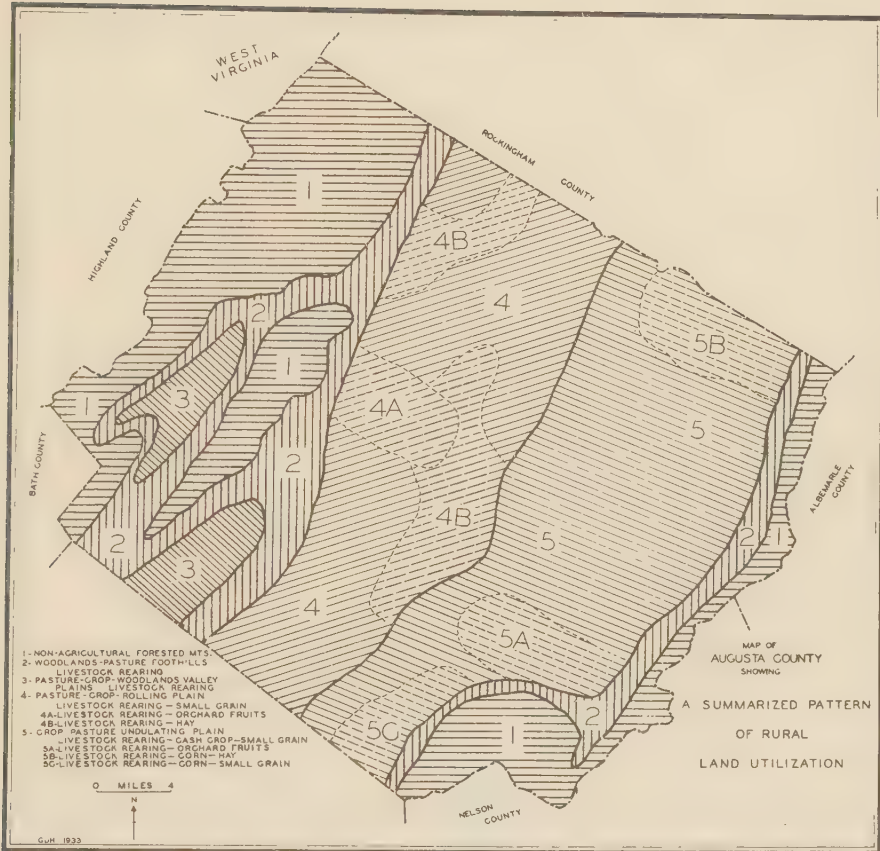


Fig. 4.- A summarized pattern of rural land utilization. To present a complete graphic summary of the land utilization of an area at least three things should be included, namely, the major uses of the land, the major natural factors to which the uses are related, and the major uses of the products of the land. This pattern represents an attempt to present Augusta County in this manner. It is a composite of those foregoing patterns that are based on field data and the uses that are made of the products of the land as determined by the census data (see caption for Fig. 5). The titles of the five divisions thus obtained reveal the major uses of the land and the topographic features to which they are intimately related. The secondary titles indicate the major uses of the products of the land, livestock rearing, and the primary non-livestock crops that are grown. Each of the first three divisions are relatively uniform in the three items represented. The last two show some variation. These variations are characterized in tertiary titles, names for the major sub-divisions.

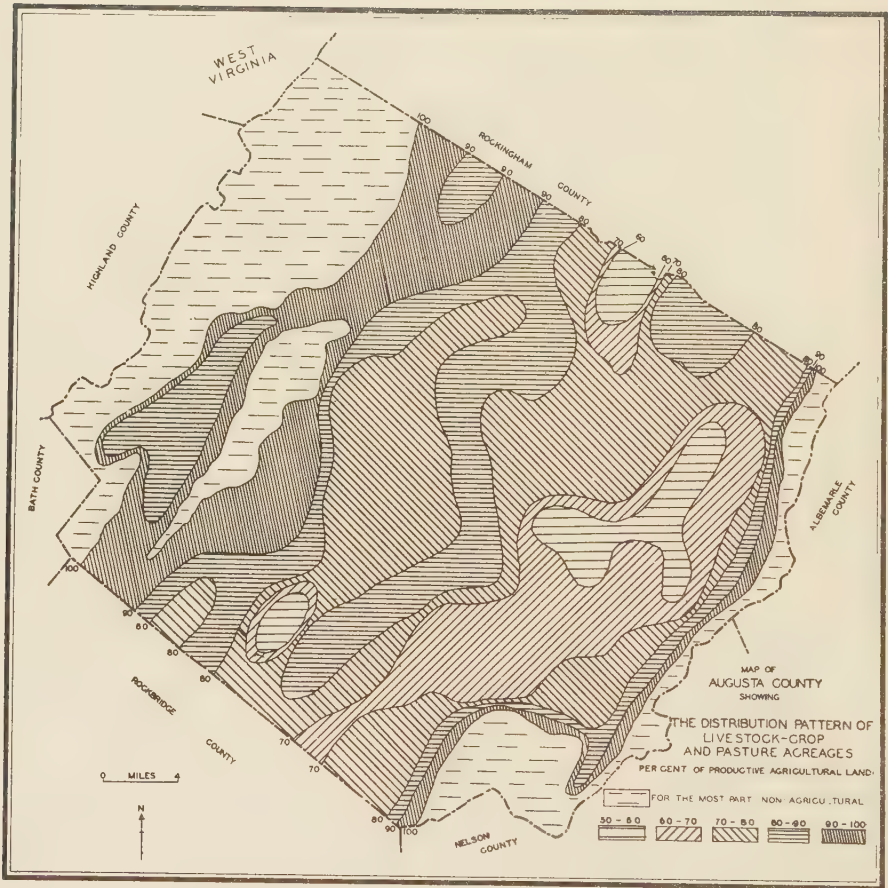


Fig. 5.- The distribution pattern of livestock-crop and pasture acreages (per cent of productive agricultural land). Census schedules gave, in tons and bushels, the amounts of livestock crops sold off of the 225 sample farms and, under another heading, the yields of these crops in tons and bushels per acre. Using this data it was possible to determine the acreages of individual livestock crops the products from which remained on the farm. The total added to the total pasture acreages gave the total acreage devoted to livestock and formed the basis for calculating the proportion of land so used in each rectangle. This figure, based on these proportions, leaves no doubt as to the dominating use made of the products of productive agricultural land in Augusta County. It, together with the preceding patterns based on field data, forms the basis for The Summarized Pattern of Rural Land Utilization, Figure 4.

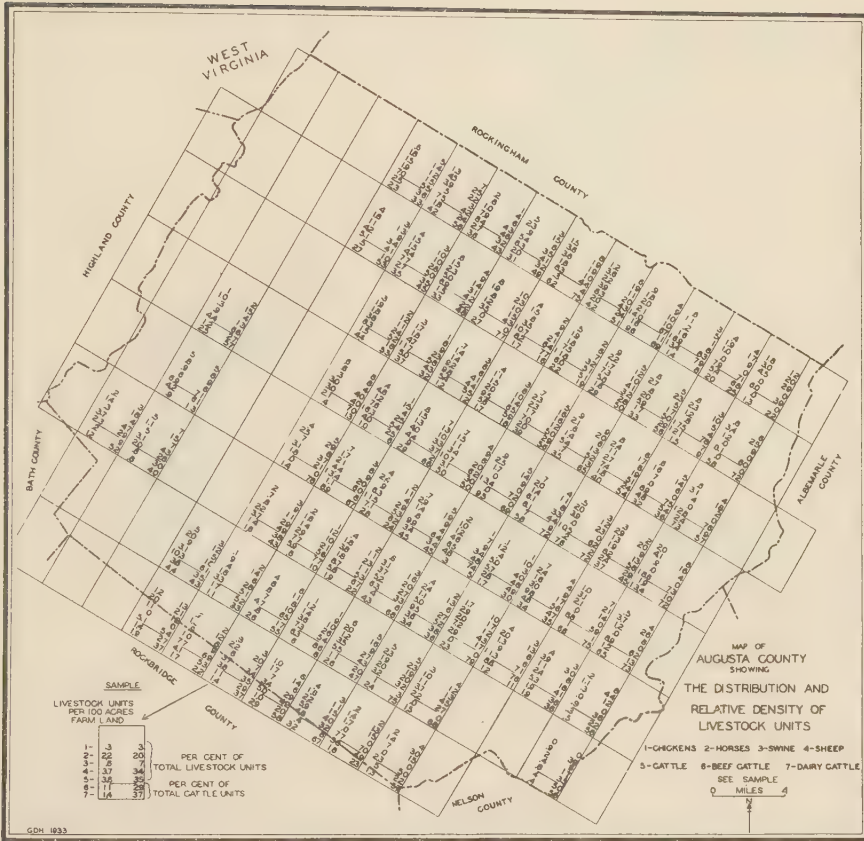


Fig. 6.- The distribution and relative density of livestock units.

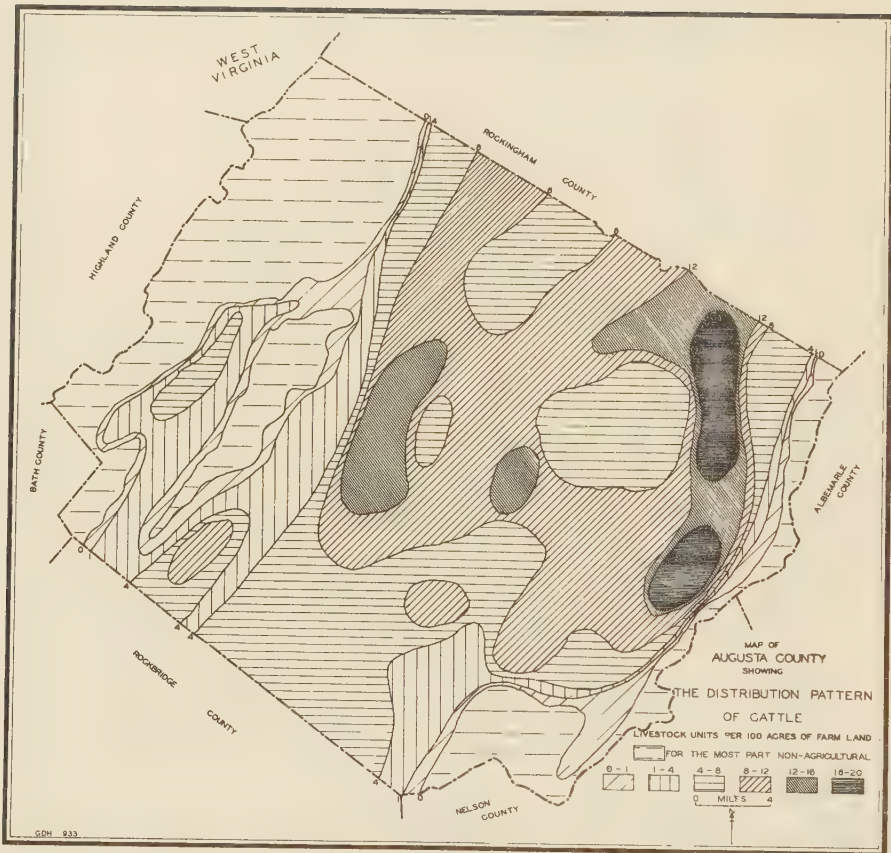


Fig. 7.- The distribution pattern of cattle.

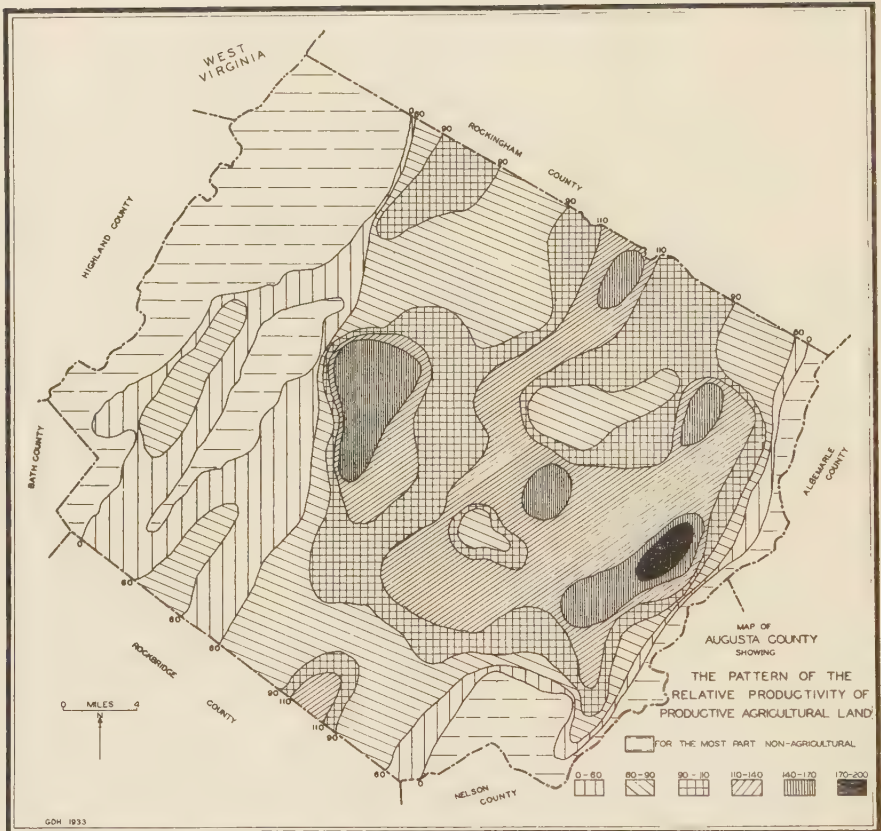


Fig. 9.- The pattern of the relative productivity of productive agricultural land.

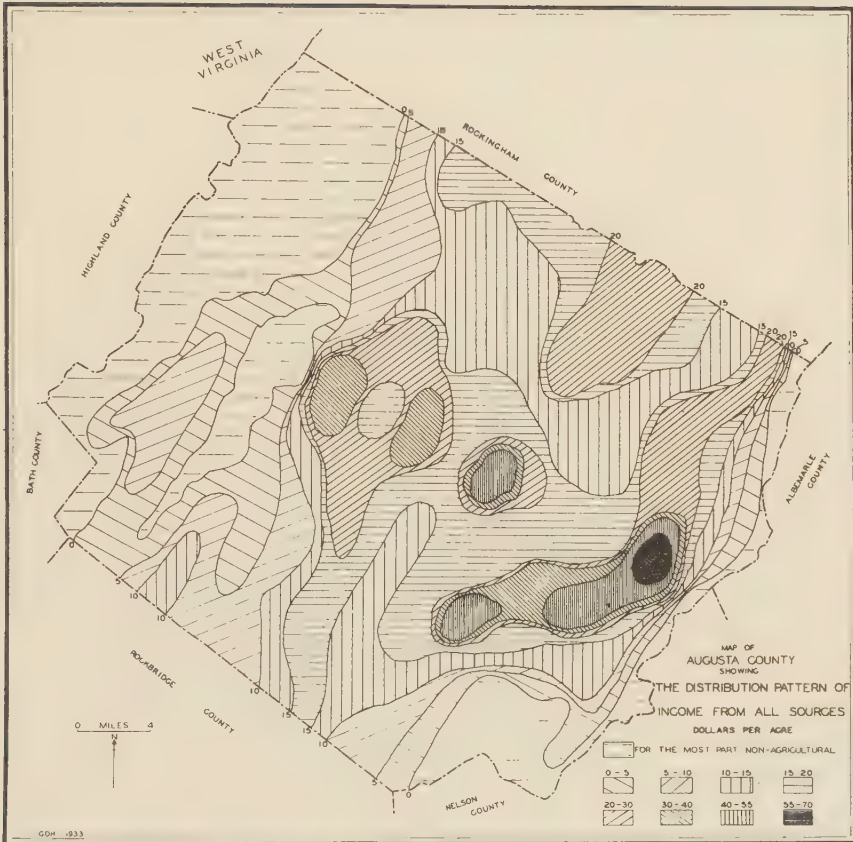


Fig. 10.- The distribution pattern of income from all sources (dollars per acre).

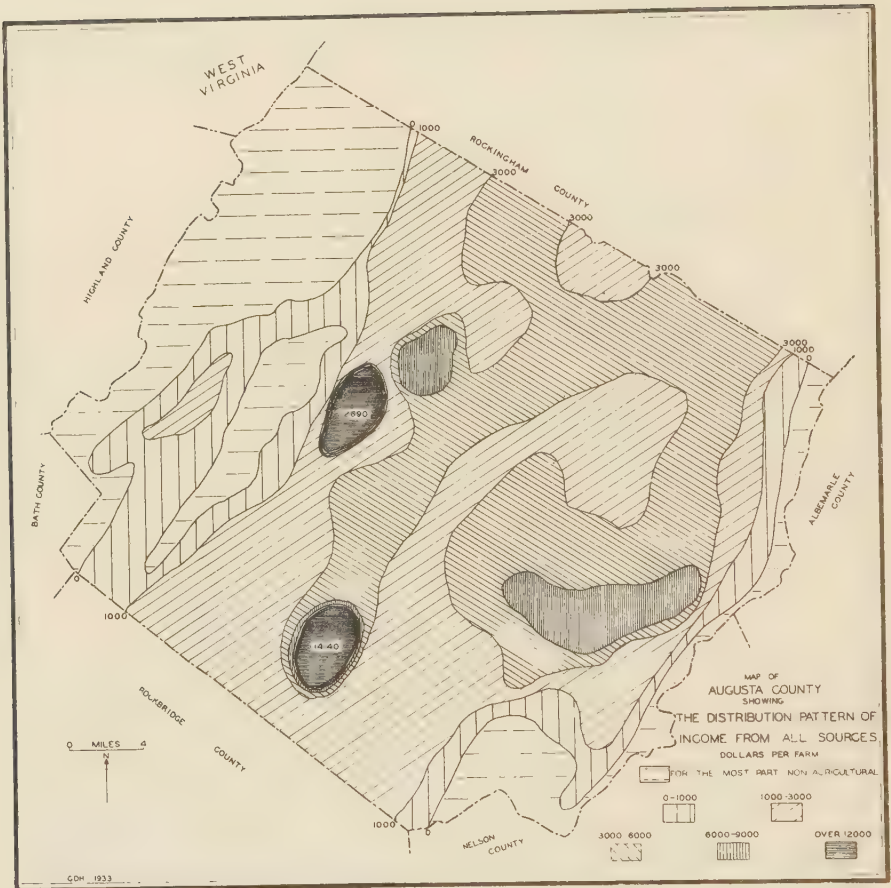


Fig. 11.- The distribution pattern of income from all sources (dollars per farm).



Fig. 12.- The distribution pattern of total values of farm property (hundreds of dollars per farm).

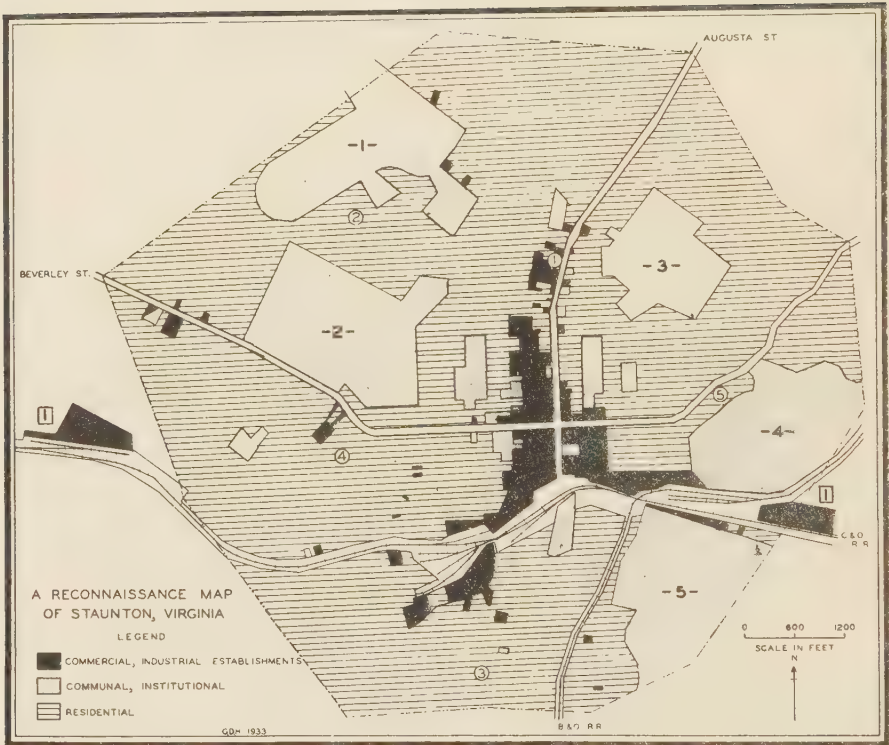


Fig. 16.- A reconnaissance map of Staunton, Virginia. The outstanding "county" functions of Staunton as a commercial, social, and political center is indicated by: (a) the relatively large areas given to business purposes; (b) the relatively large areas given to institutional-communal purposes; and (c) the convergence of the street pattern, oriented as it is in large measure to the two main thoroughfares indicated, on the centrally located business district. The boxed numbers indicate units of the Basic Furniture Company, the only major manufacturing plants in Staunton; the five stippled areas are: -1- the Shenandoah Valley Fair Grounds, -2- Thorn Rose Cemetery, -3- Staunton Military Academy, -4- the Virginia School for the Deaf and the Blind, and -5- Western State Hospital; and the encircled numbers refer to the sample blocks treated in the complete dissertation.

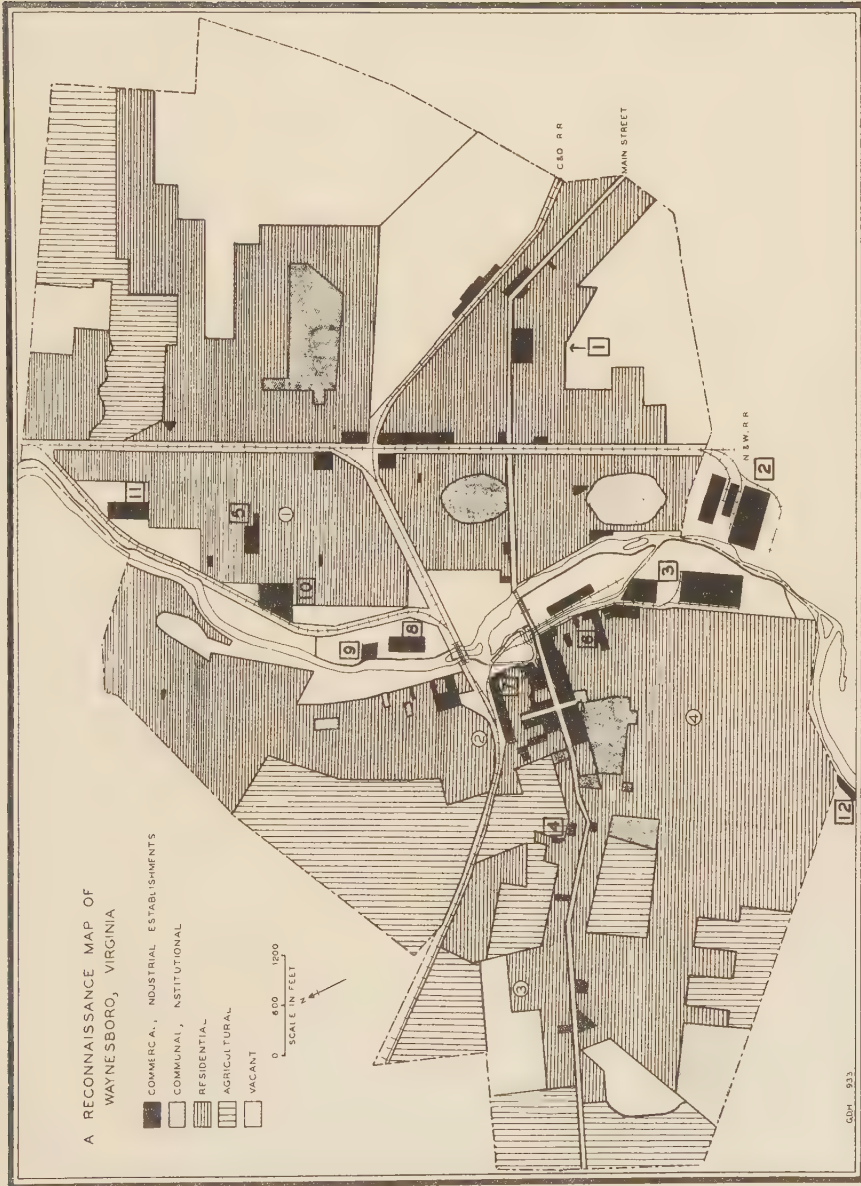


Fig. 14.- A reconnaissance map of Waynesboro, Virginia. The boxed numbers indicate manufactural establishments. The encircled numbers refer to sample blocks treated in the complete dissertation.

